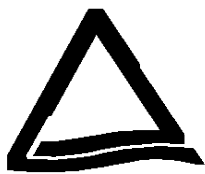
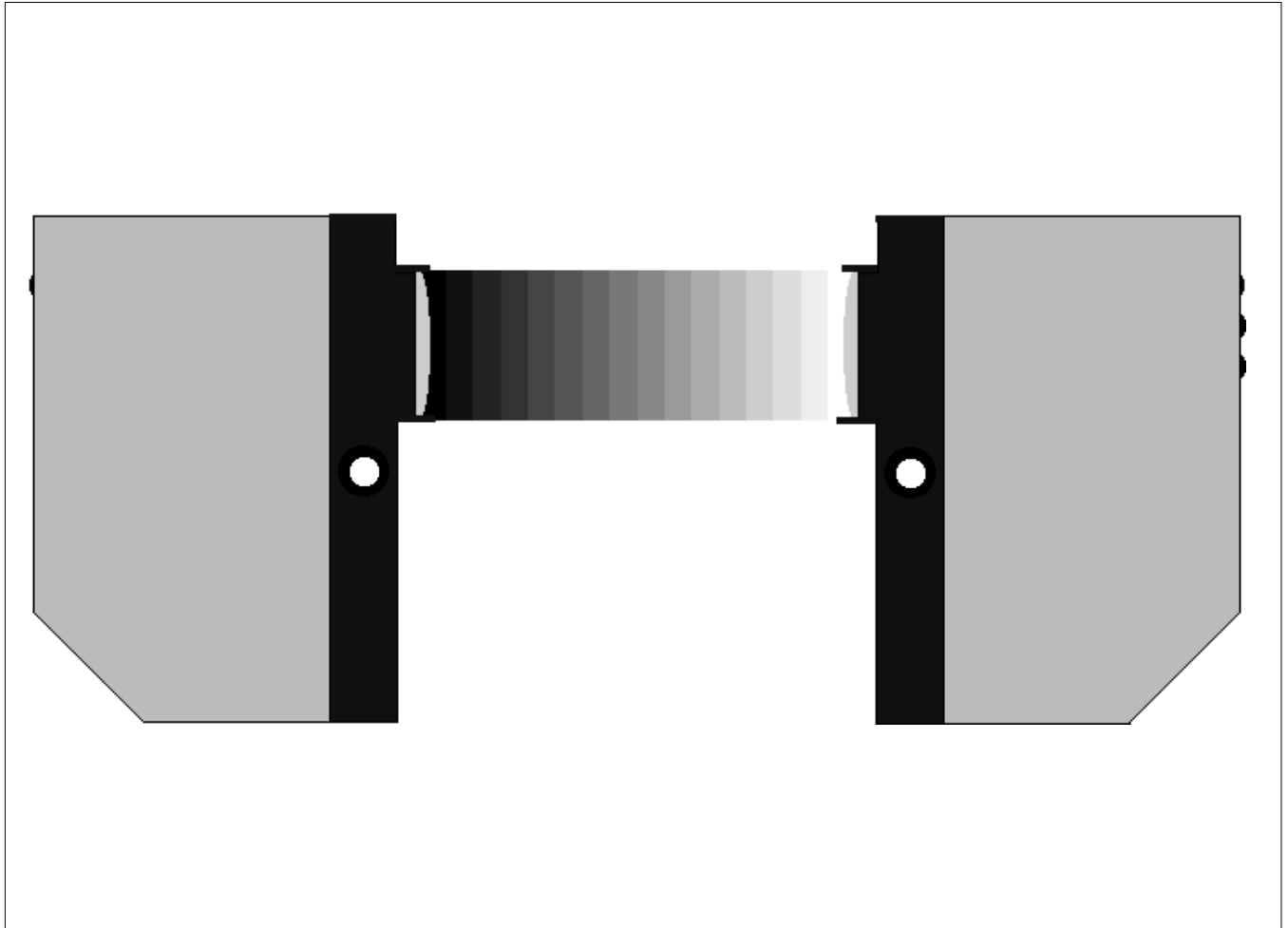


Operating instructions

**TÜV Rheinland**

CONTENTS

Safety instructions
Application
Instructions for use
Mechanical data
Electrical connection
Putting into operation



FISSLER

ELEKTRONIK

For 40 years

we have been specialists in the field of Opto-Electronics.

Our experience is your benefit.

Tell us your problems and we will be pleased to advise you.

Chapter	Content	Page
1	Safety instructions 	5
2	Terms	6
3	Prerequisites for using the accident preventing single-beam light barriers	7
4	Description and areas where the devices find application	
4.1	General instructions	8
4.2	Equipment designation / order-placing designation	9
4.3	Functions description of the transmitter and receiver EU2K	10
4.4	Functions overview of the switching units LSUW.....for EU2K	11
5	Mechanical data, dimension drawings	
5.1	Transmitter and receiver	12
5.2	Diversion mirrors for EU2K	13
5.3	Switching units LSUW.... for EU2K	14
5.4	Mounting housing IP 55 for the switching unit LSUW....	15
6	Mounting	
6.1	Safety clearance from the danger zone	16
6.2	Mounting conditions	17
6.3	Mounting the transmitter and receiver	19
6.4	Operation with beam-diversion mirrors	20
7	Electrical connection	
7.1	General instructions	
7.1.1	EU2K transmitter, EU2K receiver	21
7.1.2	Switching units LSUW....	22
7.2	Connection diagram for switching unit LSUW N1 230V AC / 115 V AC	23
7.3	Connection diagram for switching unit LSUW N1 K 230V AC	24
7.4	Connection diagram for switching unit LSUW N1 K 24V DC	25
7.5	Connection diagram for switching unit LSUW N1 Duo 230V AC / 115 V AC	
7.5.1	Protection of a danger zone with two light barriers	26
7.5.2	Protection of two independent danger zones	27
7.6	Connection diagram of switching units LSUW N1 Muting 230V AC / 115 V AC	
7.6.1	General instructions	28
7.6.2	Muting function with four muting sensors and time monitoring	29
7.6.3	Muting function with four muting sensors without time monitoring	30
7.7	Connection diagram without a switching unit with 4 fuses	31
7.8	Connection diagrams for the switching unit LSUW.....24V DC	32
8	Putting into operation	
8.1	Adjustment instructions	34
8.2	Trouble shooting	35



Safe operation of the entire equipment is only ensured by compliance with these operating instructions and observation of the corresponding accident prevention regulations. These operating instructions are component of the light barrier and must be kept at the location where the light barrier is installed.

FISSLER

ELEKTRONIK

Please observe absolutely

All safety instructions are marked with this symbol and must be observed especially.

These operating instructions furnish the user with important knowledge about the appropriate application of the accident preventing single-beam infrared light barrier EU2K with the switching units LSUW N1, LSUW N1 K, LSUW N1 Duo, LSUW N1 Muting and / or a discretely assembled sequential safety circuit with 4 contact breakers. They are component of delivery of every light barrier and must be kept at the location where the light barrier is installed.

All the information of these operating instructions must be observed absolutely.

Relevant provisions and regulations of employers insurance associations are to be complied with as well.

Read the operating instructions Before the initial operation of the accident preventing single-beam infrared light barrier EU2K the Operating Instructions must be read.

Qualified persons The mounting, initial operation and maintenance may only be performed by qualified persons.

Safety warning When operating a machine equipped with the accident preventing single-beam infrared light barrier EU2K it must be ensured that nobody is within a danger zone. A corresponding danger sign is to be put on the machine.

Light barriers do not protect anybody from machine-caused flying objects.



When the switching units such as LSUW N1, LSUW N1 K, LSUW N1 Duo and LSUW N1 Muting are used, the mains voltage must be switched off prior to removing the respective switching unit. In the base and terminal strip there are voltage conducting parts.



The connection cable of receiver and transmitter must be laying separated.



C a u t i o n , c h e c k d a i l y (at least every 24 hours):

Before every shift the light barrier has to be inspected as follows:

The light beam of the light barrier must be interrupted. During the interruption the "free" lamp should not light.

Electrosensitive protective equipment	The accident preventing single-beam infrared light barrier EU2K is an electrosensitive protective device (EPSE). EPSE is characterised by the fact that when a light beam generated by a transmitter penetrates to a receiver unit, a hazardous motion becomes interrupted or prevented.
Safety category 4	The accident preventing single-beam infrared light barrier EU2K belongs to the safety category 4, in correspondence with pr EN 954. Devices of safety category 4 are self-monitoring contactless-acting safety devices (EPSE) and represent the highest safety class under the contactless-acting protective devices.
Self monitoring	The contactless-acting protective device automatically switches itself into the "safe state" when it is faulty.
Installation range	Maximum 30m distance between transmitter and receiver. For longer ranges a red-light-laser transmitter is available.
Safety clearance	The minimum distance B is necessary between the accident preventing single-beam infrared light barrier EU2K and the nearest danger zone, for protection against injuries. To determine the minimum safety clearance, reference must be made to the formulas based on machine-specific C-standards or on the national guidelines.
Overrun	The part of hazardous motion still taking place after penetrating the light beam.
Overrun traverse	The distance covered during the overrun (stroke of a slide, path of a point on a roller surface).
Overrun period	Time period of an overrun.
Response time	The lapsed time after light beam interruption until the switching action occurs.
Valve or contactor monitor	Prior to every enabling process of switching outputs, the contactor checking routine verifies whether the switching elements connected (relays, contactors or valves) have fallen or not. Only when this has occurred, is a renewed enabling of the switching outputs possible. A dangerous switching-elements failure (relays, contactors or valves) caused by the hazardous motion is thus prevented.
Start interlock	After initial operation or after a mains interruption a renewed "enabling" is blocked by the start interlock.
Restart interlock	The restart interlock prevents automatic enabling of the switching outputs after an interruption and re-enabling of the light beam (e.g. when penetrating the light beam).
Protective operation	By interruption of the light beam the switching outputs become blocked, after re-enabling the light beam the switching outputs are automatically enabled.
Muting	Short-time safe by-pass of the accident preventing light barrier EU2K during material movement, e.g. into and out of a production cell or by with respect to high-lift storage. Thereby, certain differentiation is made between human movement and material flow.

- prEN 50 100-1
(Appendix C, mounting, putting
into operation and testing of a
EPSE on a machine)

- *The hazardous state of a machine must be ended using the sensor as much as possible.*
- *The safety clearance between the light beam and the danger zone must be long enough so that by penetration into the light beam the danger area cannot be reached before the hazardous motion is interrupted or ended.*
- *The access to the danger zone should be possible only through the light barrier. (Under-going, climbing over or circumventing should not be possible.)*
- *Striding through the light beam should not be possible.*
When it is possible to stride across the light barrier, the restart lock should be activated in case of interruption, so that a new command for triggering the next hazardous machine motion can only initiated via an enabled button. This starting button must be located at a place, from where the passable area can be seen without obstruction.
- *Inadvertent repetition of a hazardous motion must be appropriately and safely prevented.*
- *The safety level (class 4) of the accident preventing light barrier should at least correspond to the safety level of the machine's control system.*
- *Acceptance test:*
The installation acceptance test and inspections should be conducted by a competent person in possession of all the information supplied by the manufacturer of the machine and the EPSE.
- *Annual test:*
The operator should ensure that a competent person is assigned to check the light barrier annually. This person can be an employee either from the light-barrier manufacturer or from the operator.



Fiessler Elektronik company will upon customer's request perform the initial acceptance and the annual test. Additionally, customer training seminars on how to execute annual tests will be conducted at regular intervals.

The accident preventing single-beam light barrier EU2K is a contactless-acting protection and control device (BWS), whose purpose is to protect human beings from accidents.

This is realised such that the power-driven machine tool is screened so that access to the hazardous machine parts is only possible through the light barrier beam.

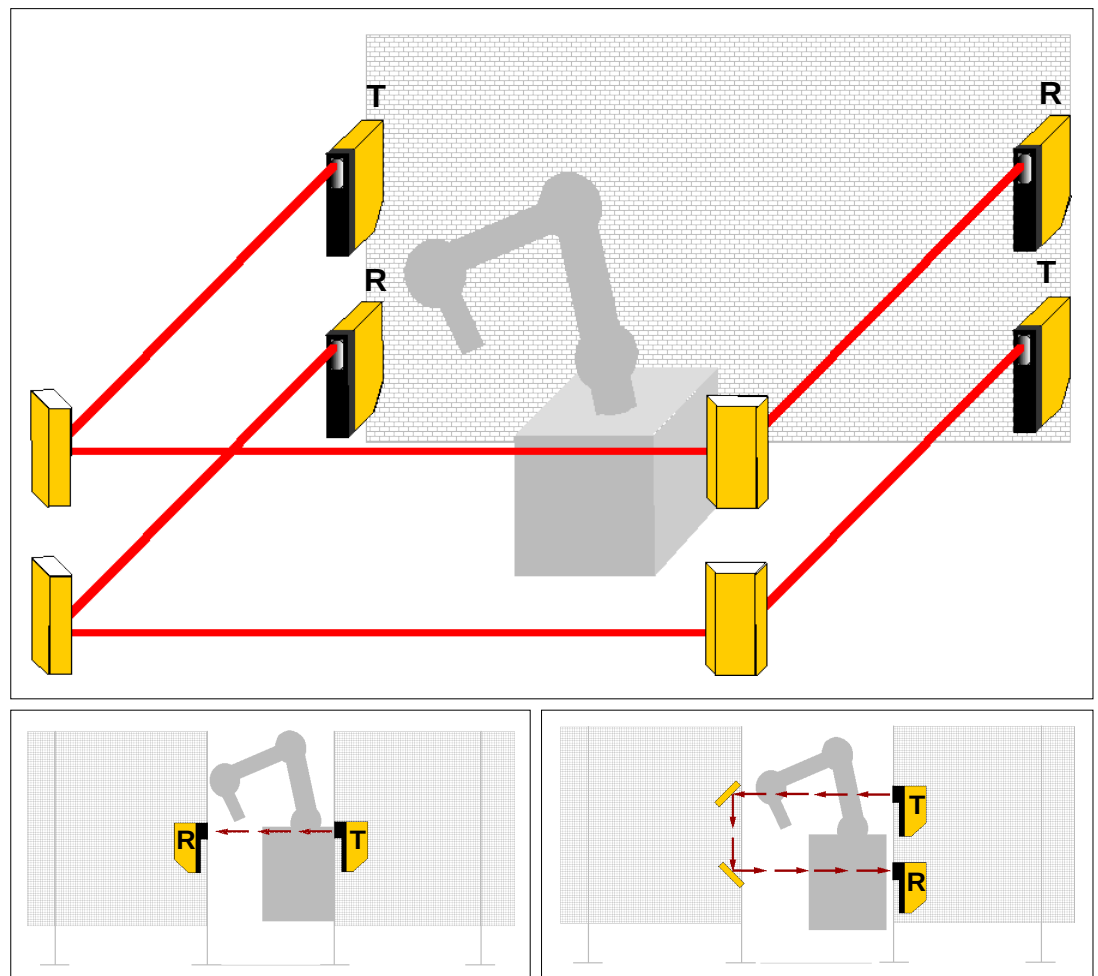
By penetration into the light beam the machine is timely and reliably brought to standstill.

Accident preventing single-beam infrared light barriers of the EU2K series

- are approved by TÜV, and accepted by the BG
- correspond to the prEN 50 100, type 4
- are self-monitoring without auxiliary circuitry
- are characterised by a compact design, easy mounting and adjustment.

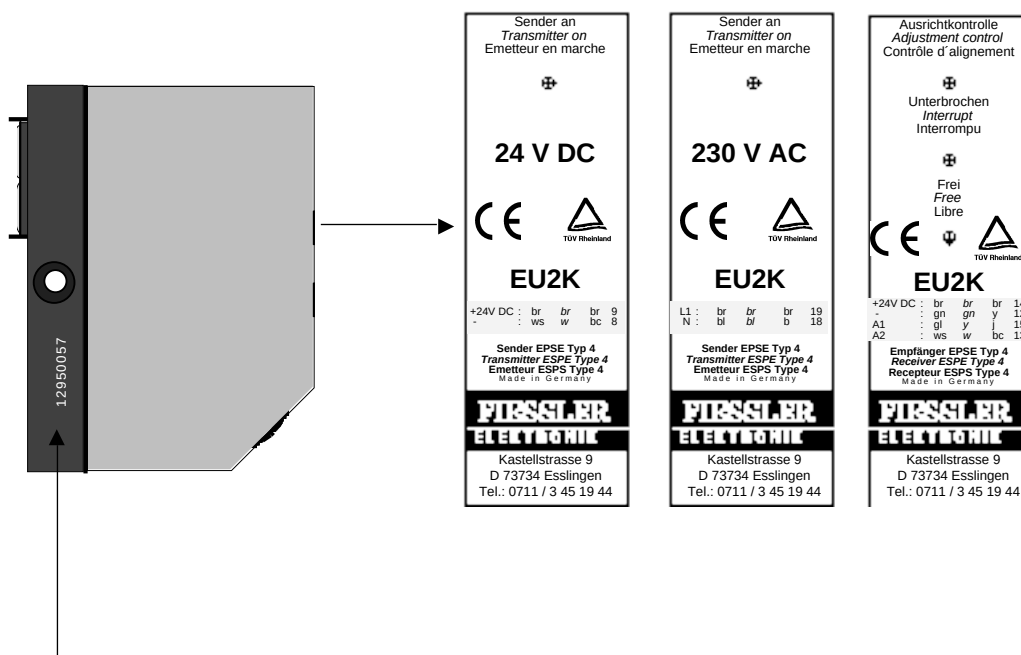
Application areas for the accident preventing single-beam infrared light barrier of the EU2K series are the screening of access areas, e.g. for:

- metal presses, wood, plastic, rubber, leather, glass processing
- filter presses
- folding and bending machines
- machining centres and welding presses
- pick-and place machines
- robots
- palletising equipment
- protecting stores
- doors and gates
- etc.



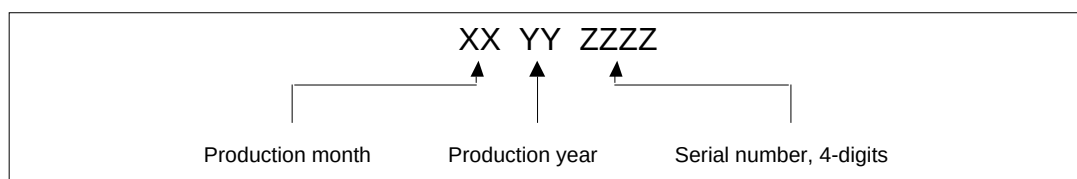
Different possibilities of protecting accessed areas.

Type plate The name plates are located on the back side of the housing of the transmitter and receiver.

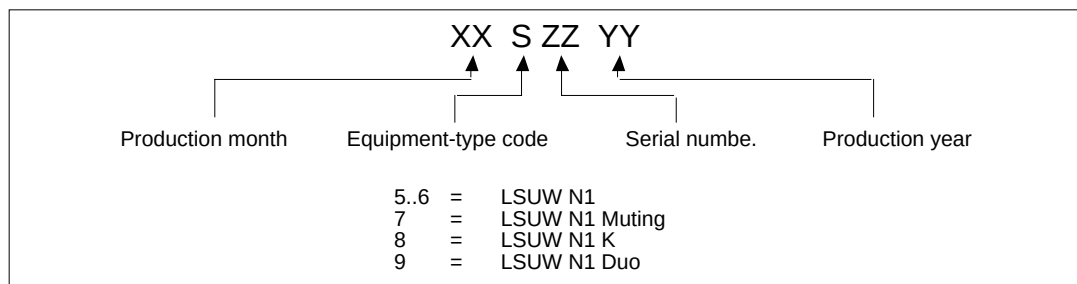


Serial number code The engraved device number is located on the black optical part of the housing

Serial number code for transmitters and receivers



Equipment number code for switching units (front plate of the switching unit)



Order-placement designation

EU2K SK 230 V	Transmitter EU2K with 2m fixed cable for 230V AC
EU2K SK 24 V	Transmitter EU2K with 2m fixed cable for 24V DC
EU2K SS 24 V	Transmitter EU2K with M12 concentric plug/socket connector for 24V DC
EU2K LK 230 V	Laser-transmitter EU2K with 2m fixed cable for 230V AC
EU2K LK 24 V	Laser-transmitter EU2K with 2m fixed cable for 24V DC
EU2K LS 24 V	Laser-transmitter EU2K with concentric plug/socket connector for 24V DC
EU2K EK 24 V	Receiver EU2K with 2m fixed cable for 24V DC
EU2K ES 24 V	Receiver EU2K with M12 concentric plug/socket connector for 24V DC
EU2K LEK 24V DC	Laser-receiver EU2K with 2m fixed cable for 24V DC

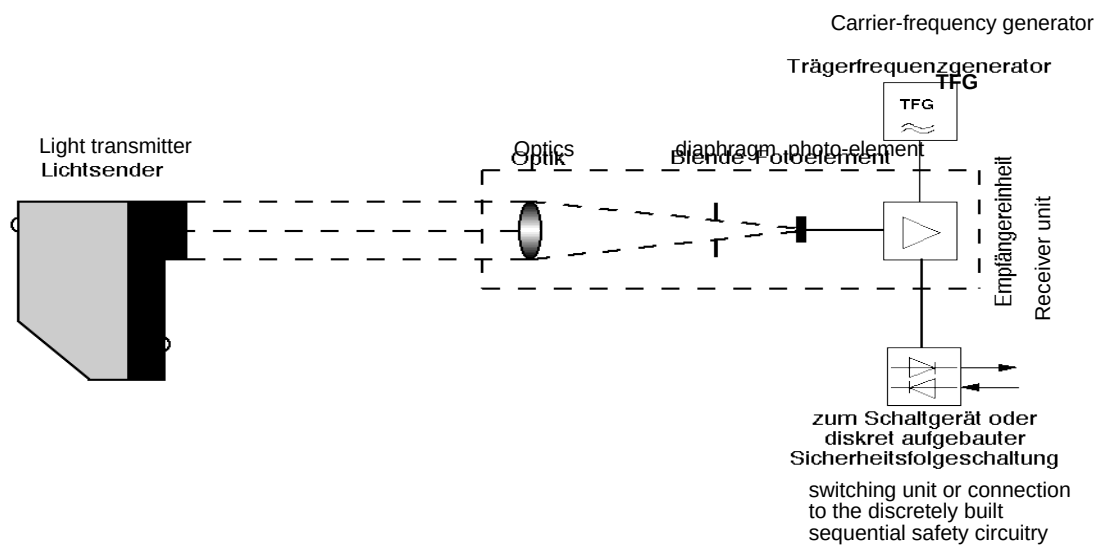
The accident preventing single-beam light barrier EU2K consists of the two components -infrared light transmitter and receiver, with which a range of 30 m can be realised. For longer ranges a red-light-laser transmitter of laser class 1 is available.

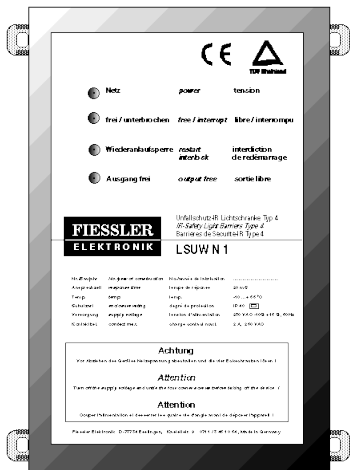
For diverse protection measures, application-optimised switching units can be delivered.

Transmitter The transmitter generates an invisible infrared pulsating light.

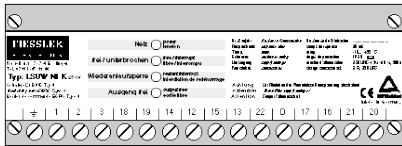
Receiver The receiver comprises a reception component and a carrier-frequency generator. By striding across the light beam the signal gets interrupted. The evaluation electronics then formulates two anti-valency signals which are fed to the switching unit or to the discretely built sequential safety circuitry.

Function diagram





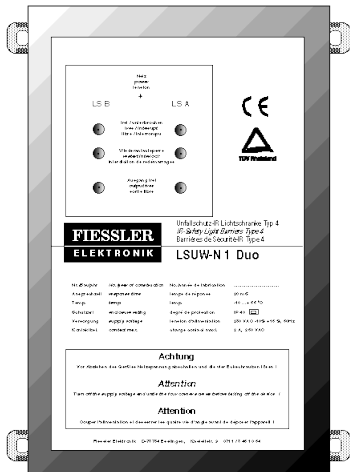
LSUW N1



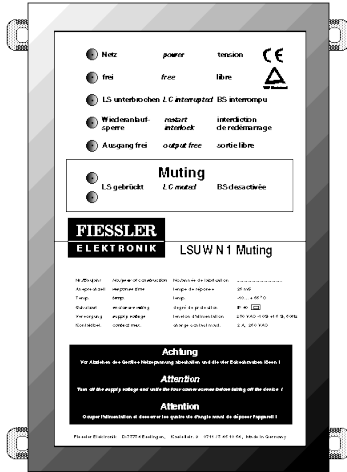
LSUW N1 K

switching unit	LSUW N1 LSUW N1 K	LSUW N1 Duo	LSUW N1 Muting	Discretely built sequential safety circuitry
Light beam-barrier monitoring	X	X	X	X
Start interlock	X	X	X	X
Restart interlock	X	X	X	X
Valve or contactors monitoring	X	X	X	X
Protective operation with restart lock during the whole cycle	X	X	X	
Two monitored closer devices for controlling the subsequent machine tool.	X	X	X	Depending on the type of the used contactors
Connector for two EPSE		X		
By-pass (muting)			X	

Functions which can be executed with the respective switching unit: X



LSUW N1 Duo for connecting two
EPSE units



LSUW N1 Muting for by-pass
functions

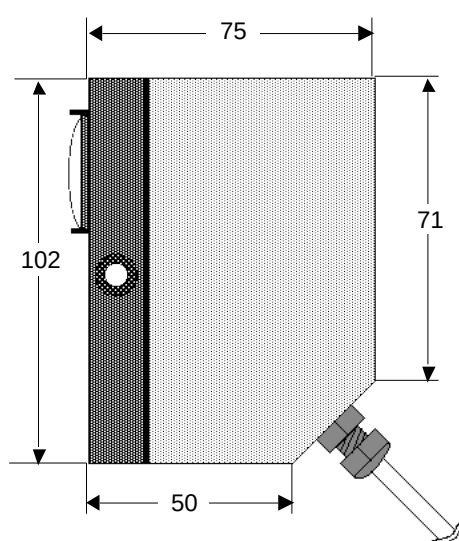
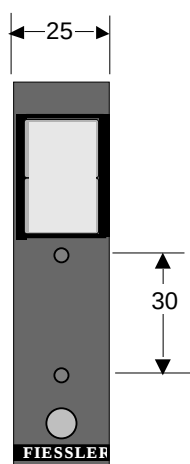
Housing execution: Yellow RAL 1020 plastic housing. Optics head is made of an acid-resistant, glass-beads-reinforced plastic (polyamide). The light exit and entry made of a pressed glass lens.

Fastening: M4 straddling dowels on three housing sides, a through hole for M6 screws for fastening on two other sides, and an optional swivel angle-piece.

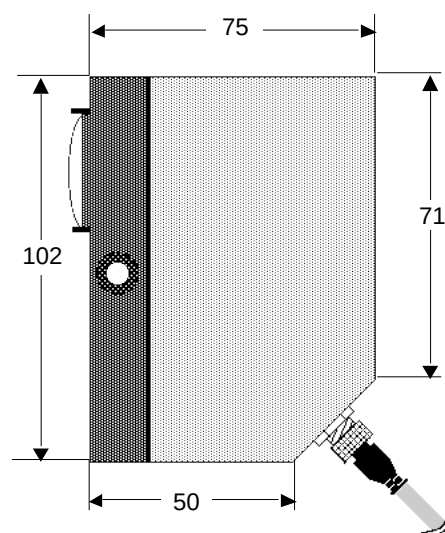
Protection system: IP 65

Electrical connection: A firmly fixed 2-wired transmitter cable, and a 4-wired receiver cable or an M12 concentric plug and socket connector.

Dimensions



EU2K SK and EU2K EK versions with a PG 7 cable, a through hole and a 2m firmly fixed cable.

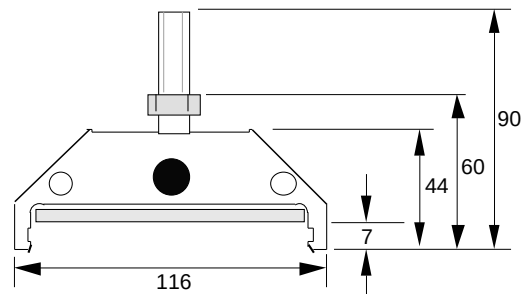


EU2K SS and EU2K ES versions with an M12 concentric plug and socket connector.

Housing execution Distortion-resistant double-chambered aluminium profile, yellow plastic-coated RAL 1021.

Fastening Ball-head screw.

Dimensions



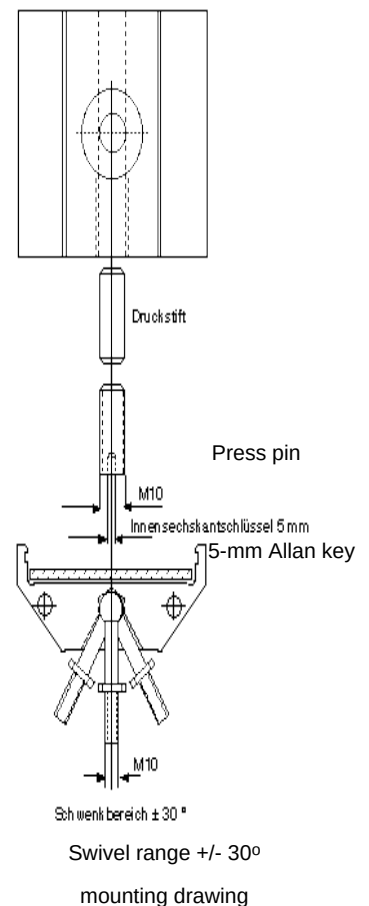
Mirror for the accident preventing single-beam light barrier EU2K

Mounting instructions:

1. Insert the ball-head screw into the blind hole as shown on the drawing.
2. Insert the copper pin.
3. Drive in the hexagon socket-head screw and tighten it with a 5 mm Allan key.

The mirror can be fitted on a holder with the help of the ball-head screw.

Other mounting possibilities are provided for by means of the threaded holes on the mirror profile.



N1, N1 Duo, N1 Muting
Housing execution:

ABS-plastic housing, yellow RAL 1020.

Fastening:

Four bores in the plug-socket, see drawing.

Optional snap-fastening on top hut rail according to DIN EN 50022-35

Protection system:

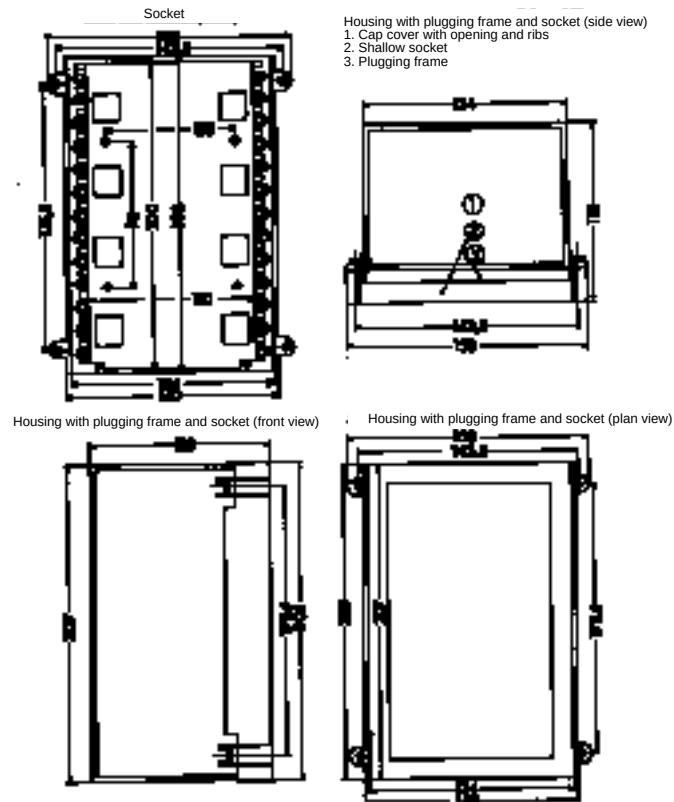
IP 40, switch-cabinet version. Increased protection system IP 55 through mounting housing.

Electrical connection:

Can be plugged in a terminal socket.

Weight:

2550g


N1 K
Housing execution:

Insulation material black housing, cover beige

Fastening:

Snap-fastener on top-hut rail according to DIN EN 50022-35 Screw fastener M4 with 80 mm grid

Protection system:

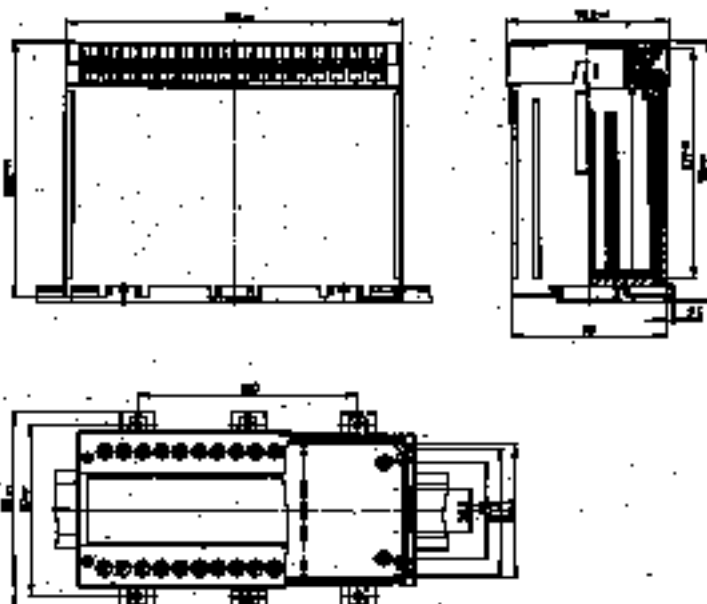
IP 20 (switching unit must be mounted in a housing of IP 55 or in the switch cabinet)

Electrical connection:

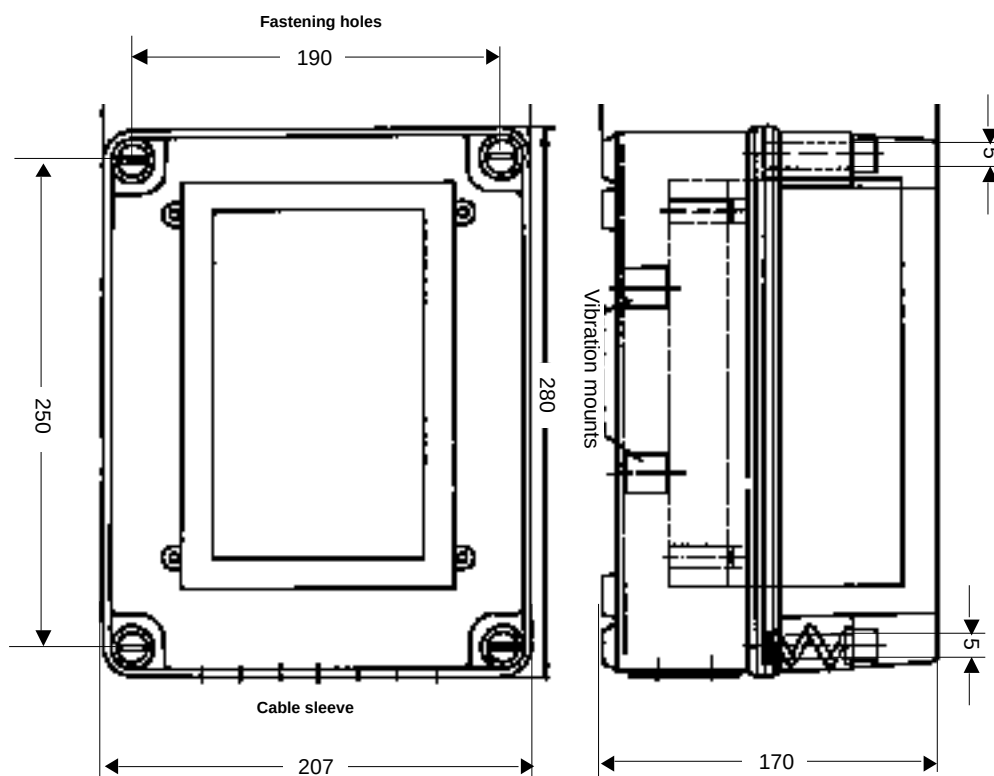
Plugged on a terminal strip.

Weight:

800g



Housing execution:	Grey plastic housing, transparent Makrolon cover
Fastening:	Four holes in housing base
Protection system:	IP 55
Electrical connection:	Cable passage through PG-screw connector
Weight:	800g

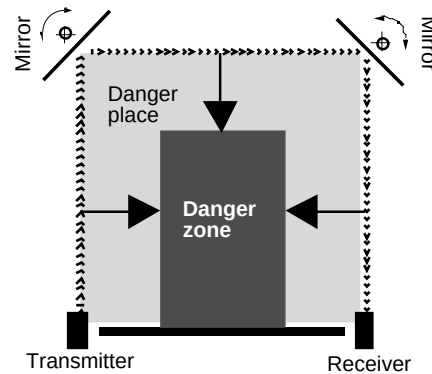


General mounting instructions



The safety clearance **S** between the accident preventing single-beam light barrier EU2K and the danger zone must be so wide that when one penetrates into the light beam the danger zone cannot be reached before the hazardous motion is ended.

Thereby, also refer to prEN 999 and further relevant national and international safety provisions.

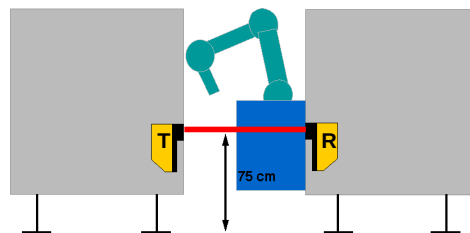


Safety clearance The safety clearance **S** (in mm) depends on:

Approach velocity	v
Response time of the protection device	t1
by EU2K without a switching unit, amounts to	12ms,
with the switching units LSUW N1, LSUW N1 K and LSUW N1 Duo	20ms,
with the switching unit LSUW N1 Muting	25 ms,
Overrun of the power-driven machine tool	t2

For the approach velocity **v**, 1600 mm/s (1.6 m/s) is entered.

The safety clearance **S** (in mm) by a single beam protection:



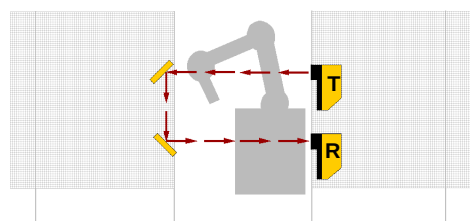
Formula for calculating the safety clearance by a single-beam protection

$$S = v (t_1 + t_2) + 1200$$

Example for calculating the safety clearance by a single-beam protection

Example:
 Overrun of the machine 150 ms
 EU2K + Switching unit LSUW N1 = 20 ms
 $S = 1.6 \text{ m/s} (20 \text{ ms} + 150 \text{ ms}) + 1200$
 $S = 1472 \text{ mm} = 1.472 \text{ m}$

The safety clearance **S** (in mm) by a multiple-beam protection:



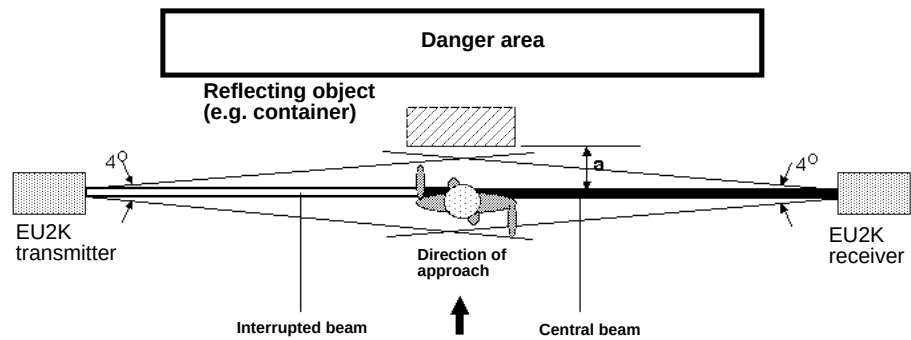
Formula for calculating the safety clearance by a multiple-beam protection

$$S = v (t_1 + t_2) + 850$$

Example for calculating the safety clearance by a double-beam protection

Example:
 Overrun of the machine 150 ms
 EU2K + Switching unit LSUW N1 = 20 ms
 $S = 1.6 \text{ m/s} (20 \text{ ms} + 150 \text{ ms}) + 850$
 $S = 1122 \text{ mm} = 1.122 \text{ m}$

Distance to mirror-reflection surfaces



In order to avoid the reflection and non-recognition of an obstacle caused by reflective objects, the accident preventing single-beam infrared light barrier EU2K must be mounted with a minimum distance a from a reflective object. The minimum distance a can be derived from the following table:

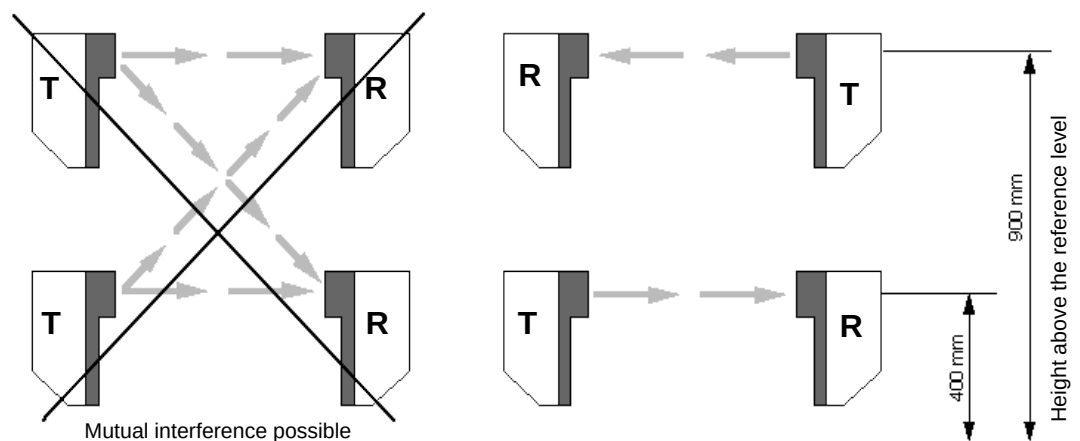
Installed range in m	0-4	5	10	15	20	25	30
Distance a in mm	150	170	350	500	700	850	1000

When a EU2K is mounted as a single-beam protection device, a beam height of 750 mm above the reference level should be maintained.



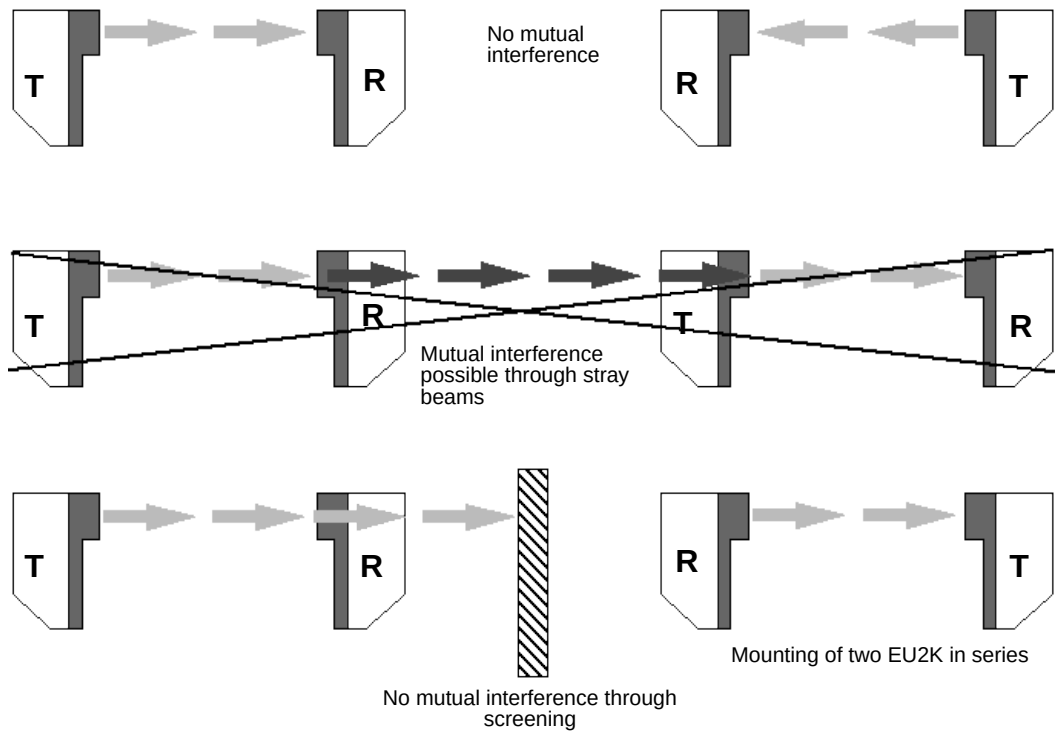
Arrangement of two accident preventing single-beam light barriers above each other.

If two or several EU2K light barriers are required for protection, mutual interference must be ruled out. Since the light-beam diameter increases with increased distance apart, it must be ensured that only the corresponding receiver gets the transmitted signal. To rule out this mutual interference, the following instructions must be implemented during the installation.



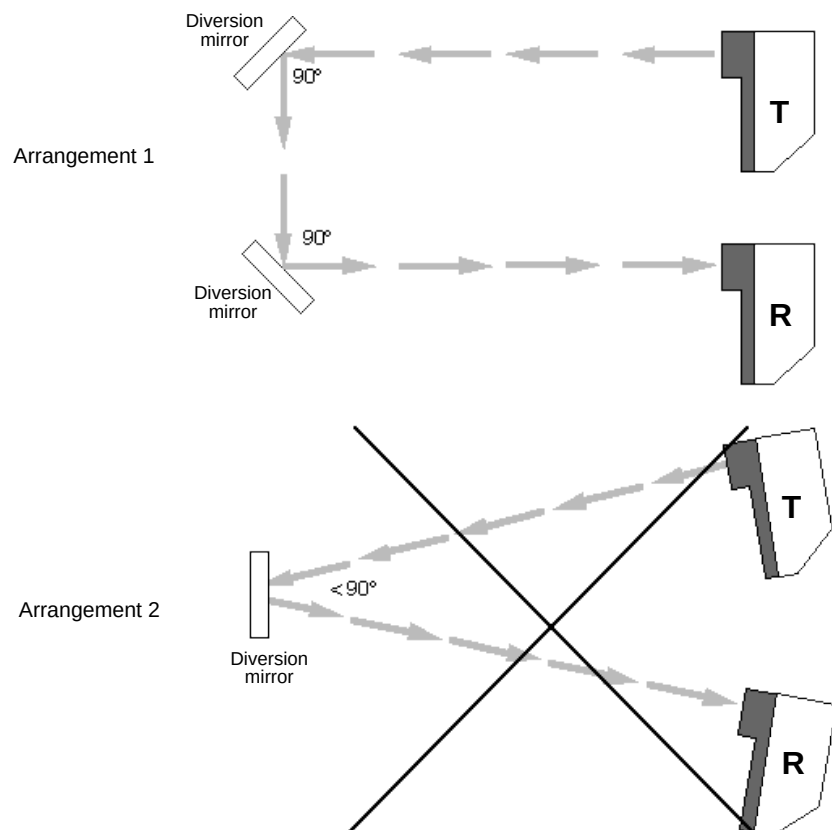
When two EU2K are installed above each other, the transmitter and receiver of one light barrier unit must be interchanged. A transmitter should **never** be mounted above another transmitter or a receiver above another receiver.

Arrangement of two accident preventing single-beam light barriers in series



When two EU2K units are mounted in series, mutual interference by stray beams must be ruled out. This is thus achieved a.) by the second light barrier the transmitter and receiver are interchanged or b.) a screen is fitted between both light barrier units.

Danger zone protection using mirrors



Attention!

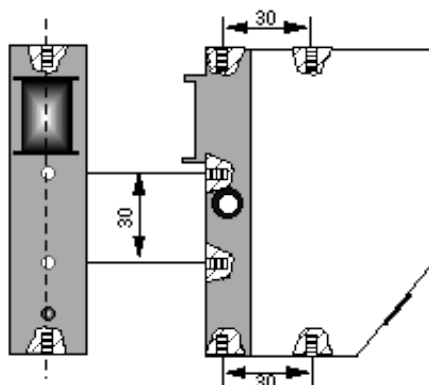


Arrangement 2 is not permitted.

Protection using a mirror by which the reflection angle $< 90^\circ$, conceals the danger of false reflection caused by a reflective object (e.g. a shiny sheet metal, which a worker carries into the danger zone). Due to this false reflection it is possible to access the protected zone without being recognised by the light barrier.

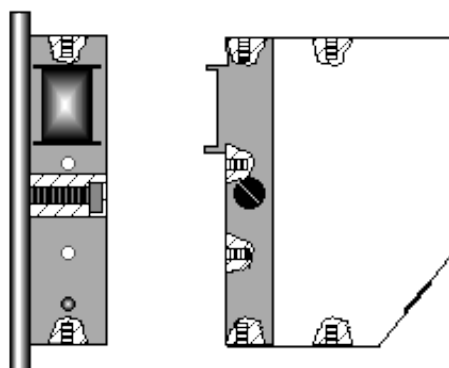
Details under Chapter 6.4

Mounting the transmitter and receiver with straddled dowels

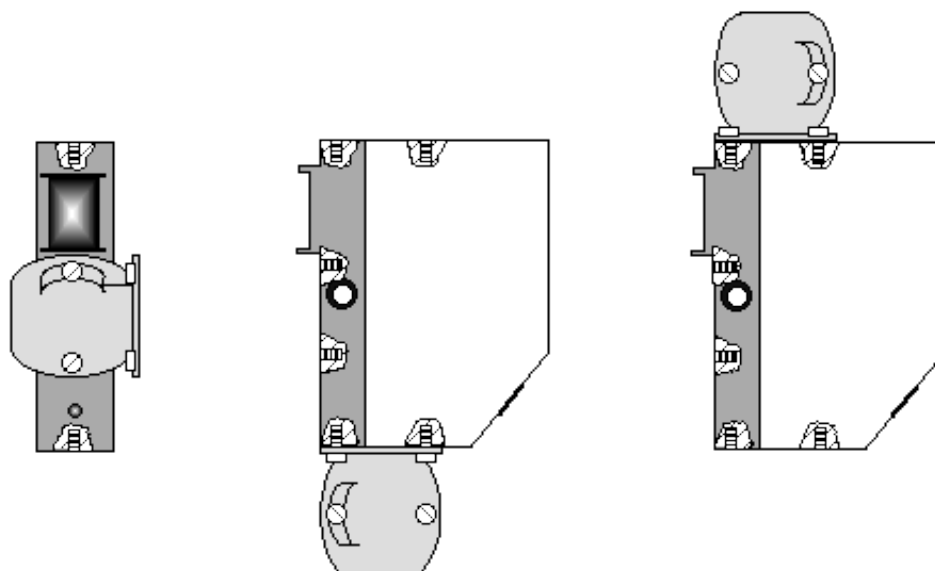


6 Straddled dowels on three sides of the housing

Mounting the transmitter and receiver by means of an M6 screw and through hole



Mounting the transmitter and receiver with a swivel-fastening angle.



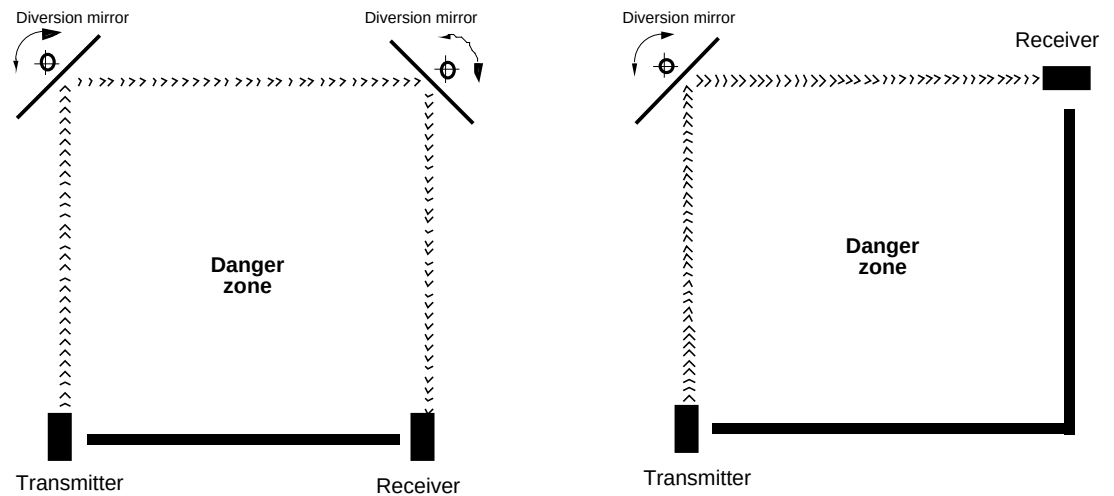
Example of possibilities for mounting with a swivel-fastening angle



Important:

In order to ensure error-free operation, both of the light transmitter and receiver are fastened on stabilised structures.

Multiple-sided protection Light beam can be circumvented around a danger place by using diversion mirrors, to enable multiple-sided protection.



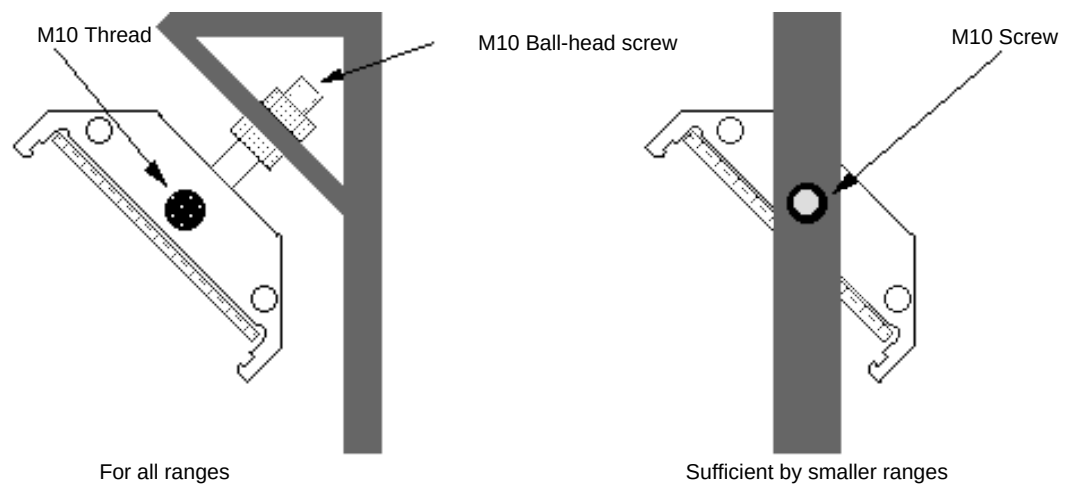
Thereby, the reflection law of optics is valid - the angle of incidence is equal to the angle of reflection. By a diversion of 90° the mirror as such must be mounted at an angle of 45° .

Mirror losses Every diversion via a mirror weakens the received signal by about 40%.

The max. range by diversion using one mirror is 18 m, by diversion using two mirrors 11 m.

Transmitter, receiver and mirror should be perfectly mounted vertically and checked with a water-level.

Mounting



For all ranges

Sufficient by smaller ranges

Operation safety is only then ensured if the mirror is fastened in a stable manner.

Adjustment instructions are described in Chapter 8.

Electrical and environmental data	EU2K transmitter, EU2K receiver		
	EU2K SK 230V AC Transmitter	EU2K SK 24V DC Transmitter	EU2K SS 24V DC Transmitter
Operating voltage	230 V 50 Hz, -15%, + 10%	24 V DC, +/-15%, 1.2 V ripple	24 V DC, +/-15%, 1.2 V ripple
Power consumption	1,7 VA	1,7 VA	1,7 VA
Transmitted light	Modulated IR-light	Modulated IR-light	Modulated IR-light
Protection system	IP 65	IP 65	IP 65
Connection type	2-wired cable, 2m long	2-wired cable, 2m long	M12 concentric plug and socket
Operation temperature	-10°C up to +55°C	-10°C up to +55°C	-10°C up to +55°C
Storage and transport temperature	-25°C up to +70°C	-25°C up to +70°C	-25°C up to +70°C
Weight	250 g	200 g	200 g
Electrical and environmental data	EU2K transmitter, EU2K receiver		
	EU2K LK 230V AC Transmitter	EU2K LK 24V DC Transmitter	EU2K LS 24V DC Transmitter
Operating voltage	230 V 50 Hz, - 15 %, + 10 %	24 V DC, +/-15%, 1.2 V ripple	24 V DC, +/-15%, 1.2 V ripple
Power consumption	1,7 VA	1,7 VA	1,7 VA
Transmitted light	Modulated red-light laser 670 nm class 1	Modulated red-light laser 670 nm class 1	Modulated red-light laser 670 nm class 1
Protection system	IP 65	IP 65	IP 65
Connection type	2-wired cable, 2m long	2-wired cable, 2m long	M12 concentric plug and socket
Operation temperature	-10°C up to +55°C	-10°C up to +55°C	-10°C up to +55°C
Storage and transport temperature	-25°C up to +70°C	-25°C up to +70°C	-25°C up to +70°C
Weight	250 g	200 g	200 g
Electrical and environmental data	EU2K receiver		
	EU2K EK 24V DC Receiver	EU2K ES 24V DC Receiver	EU2K LEK 24V DC Receiver
Operating voltage	24 V DC, +/-15%, 1.2 V ripple	24 V DC, +/-15%, 1.2 V ripple	24 V DC, +/-15%, 1.2 V ripple
Power consumption	max.: 4,1 VA	max.: 4,1 VA	max.: 4,1 VA
Switching functions	2 anti-valency PNP outputs, short-circuit resistant		
Switching power	24 V, max. 0,2 A	24 V, max. 0,2 A	24 V, max. 0,2 A
Protection system	IP 65	IP 65	IP 65
Connection type	2-wired cable, 2m long	M12 concentric plug and socket	2-wired cable, 2m long
Operation temperature	-10°C up to +55°C	-10°C up to +55°C	10°C up to +55°C
Storage and transport temperature	-25°C up to +70°C	-25°C up to +70°C	-25°C up to +70°C
Reverse battery protection	Not protected against all possibilities of faulty connection		
Max. switching current	150 mA	150 mA	150 mA
Weight	200 g	200 g	200 g

Electrical data

Connection type Switching unit LSUW N1, N1 Duo and N1 Muting: Socket with screw terminals for 0.75 mm² 230 V / 60 VA, Switching unit LSUW N1 K: Plugged terminal strip

Operation voltage 230 V 50 Hz, -15%, + 10% (optional 24V DC)

Max. current consumption Max. 0.09 A

Reverse battery protection Not protected against all possibilities of errors

Switching functions 2 Potential-free, monitored and guided make-contact paths

Switching voltage 250 V AC

Load current Max. 2 A, induction-free

Load capacitance Induction free. By an inductive load spark extinguishers must be used in parallel to the load. (e.g. 0,22 µF, 220 Ω).

Short circuit proof Guided contacts shielded with 3.15 A.

Switching time EU2K: 12 ms between light beam interruption and the switching of the output.
 LSUW N1: 20 ms between light beam interruption and the opening of the output relays contacts.
 LSUW N1 K: 20 ms between light beam interruption and the opening of the output relays contacts.
 LSUW N1 Duo: 20 ms between light beam interruption and the opening of the output relays contacts.
 LSUW N1 Muting: 25 ms between light beam interruption and the opening of the output relays contacts.

Cross-sectional area of connecting cable 0.75 mm²



Cable insulation Cable insulation from all connected devices of 230 V - version must be dimensioned for the rated voltage of 250V.

Cable laying Separate from mains-current conductors. When laying cables for contactor control, short-circuit of wires must be ruled out. (No short circuit permitted between the wires from the start button and terminal 22 and control contacts).

The connection cable of receiver and transmitter must be laying separated.

Connection of other devices According to prEN 50100 it is not permissible to connect other devices to the direct-current voltage output of the switching units.

Environmental data of the switching units

Operation ambient temperature -10 up to 55°C

Storage and transport temperature -25 up to 70°C

Protective system of installation type LSUW N1 K: IP 20; other switching units IP40; optional IP 55 (mounting housing)

Moisture class E

Protection class Protective insulation



Only when the accident preventing single-beam light barrier EU2K is connected according to one of the following circuit diagrams and the additionally relevant national and international accident prevention regulations are observed is a safe operation ensured!
 Any diversion from these circuits can cause hazardous states and is as such not allowed.

SPC-drive When driven by stored program controls (SPC) through a switching unit, an output channel must be used for switching off the hazardous motion directly behind the SPC, as long as the SPC is not approved to be failure-proof in the sense of an accident prevention regulation.

Function Protective operation with a start and a restart lock, monitoring valves or contactors

Application For the protection of accessible danger zones.

Example Protection of a robot

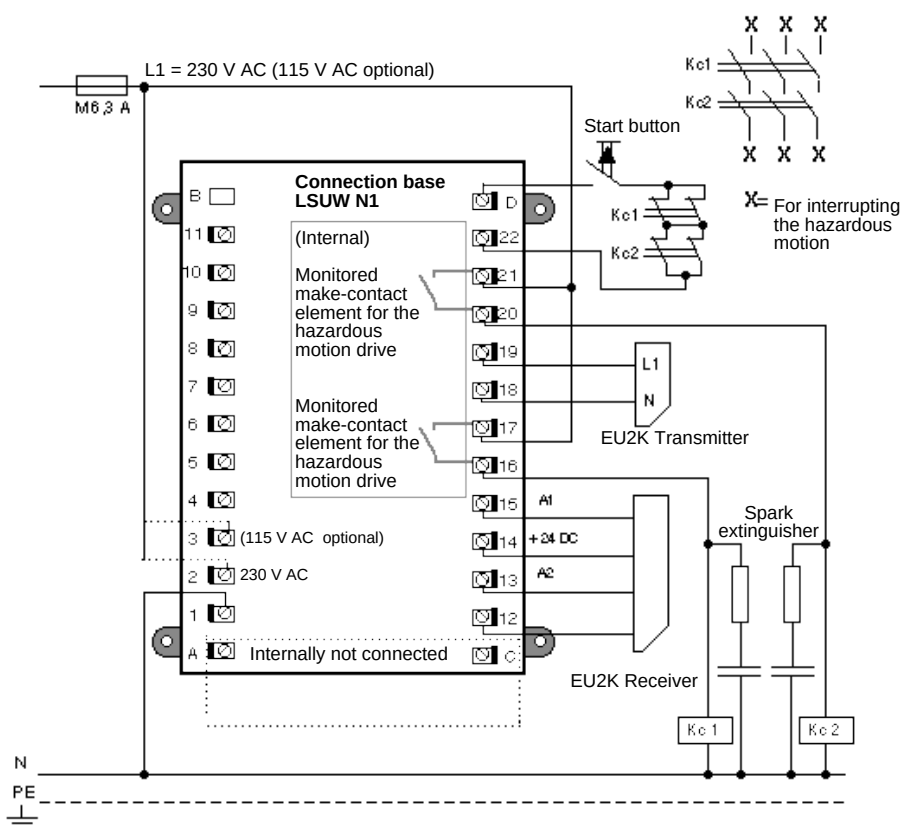
Connection circuit diagram

Transmitter connection 230 V AC

Terminal	EU2K SS
19	brown
18	blue

Receiver connection A 24 V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black



Description of functions

The transmitter is switched on by pressing the start button.

The LED on the transmitter is illuminated as control. Thus, by a free light beam the receiver is illuminated, whereby the latter switches over to "green." The "free" switching unit LED is illuminated.

If the start button is enabled, the outputs 16-17 and 20-21 are switched through, the drive for the transmitter switches as well into the self-sustaining state. The "output free" LED is illuminated.

If the light beam is interrupted, the outputs 16-17 and 20-21 are switched off.

A restart occurs only after the light beam is enabled and the start button is pressed.

The open contacts of the contactors Kc 1 and Kc 2 in series with the start button serve for functional monitoring of the contactors.

Instruction:

During adjustment the start button must either be permanently pressed or by-passed.

The start button is to be mounted such that the danger zone is well visible from the position of the button and that without interrupting a light barrier it cannot be pressed by someone within the danger zone.

Function Protective operation with a start and a restart lock, monitoring valves or contactors

Application For the protection of accessible danger zones.

Example Protection of a robot

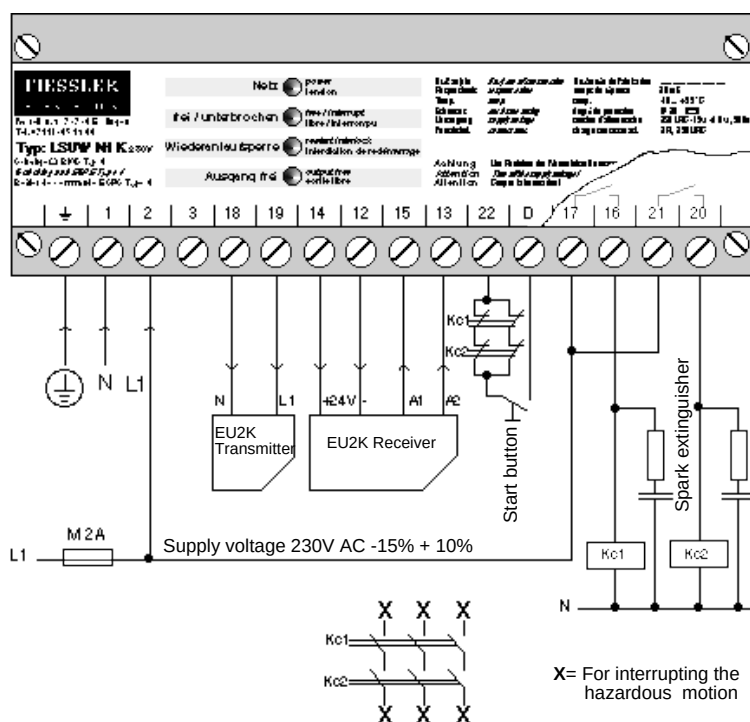
Connection circuit diagram

Transmitter connection 230 V AC

Terminal	EU2K SS
19	brown
18	blue

Receiver connection A 24 V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black



Description of functions

The transmitter is switched on by pressing the start button.

The LED on the transmitter is illuminated as control. Thus, by a free light beam the receiver is illuminated, whereby the latter switches over to "green." The "free" switching unit LED is illuminated.

If the start button is enabled, the outputs 16-17 and 20-21 are switched through, the drive for the transmitter switches as well into the self-sustaining state. The "output free" LED is illuminated.

If the light beam is interrupted, the outputs 16-17 and 20-21 are switched off.

A restart occurs only after the light beam is enabled and the start button is pressed.

The open contacts of the contactors Kc 1 and Kc 2 in series with the start button serve for functional monitoring of the contactors.

Instruction:

During adjustment the start button must either be permanently pressed or by-passed.

The start button is to be mounted such that the danger zone is well visible from the position of the button and that without interrupting a light barrier it cannot be pressed by someone within the danger zone.

Function Protective operation with a start and a restart lock, monitoring valves or contactors

Application For the protection of accessible danger zones.

Example Protection of a robot

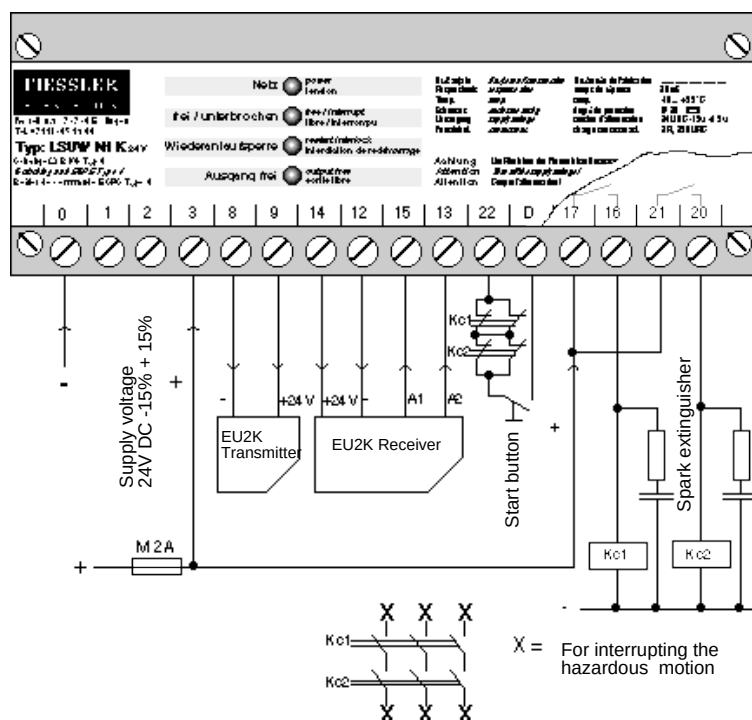
Connection circuit diagram

Transmitter connection 24 V DC

Terminal	EU2K SK	EU2K SS
9	brown	brown
8	white	blue

Receiver connection A 24 V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black



Description of functions

The transmitter is switched on by pressing the start button.

The LED on the transmitter is illuminated as control. Thus, by a free light beam the receiver is illuminated, whereby the latter switches over to "green." The "free" switching unit LED is illuminated.

If the start button is enabled, the outputs 16-17 and 20-21 are switched through, the drive for the transmitter switches as well into the self-sustaining state. The "output free" LED is illuminated.

If the light beam is interrupted, the outputs 16-17 and 20-21 are switched off.

A restart occurs only after the light beam is enabled and the start button is pressed.

The open contacts of the contactors Kc 1 and Kc 2 in series with the start button serve for functional monitoring of the contactors.

Instruction:

During adjustment the start button must either be permanently pressed or by-passed.

The start button is to be mounted such that the danger zone is well visible from the position of the button and that without interrupting a light barrier it cannot be pressed by someone within the danger zone.

Application Protecting a danger zone that is accessible from one side, with two light barriers (1 Start button).



Observe Chapter 6.2!

Connection circuit diagram

Transmitter connection A 230 V AC

Terminal	EU2K SS
18	brown
19	blue

Transmitter connection B 230 V AC

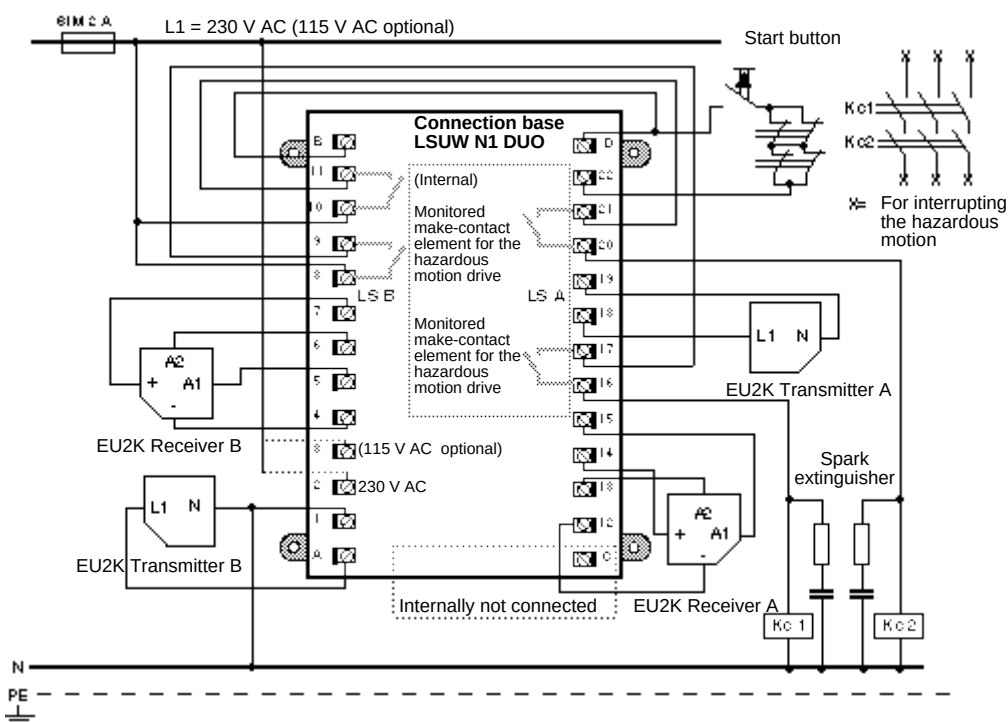
Terminal	EU2K SS
A	braun
1	blue

Receiver connection A 24 V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black

Receiver connection B 24 V DC

Terminal	EU2K EK	EU2K ES
7	brown	brown
4	green	blue
5	yellow	white
6	white	black



! Attention: 230 V AC - version. For 24 V DC - version, see Page 32, Chapter 7.8, Figure 1!

Description of functions

The transmitters A and B are switched on by pressing the start button.

The LEDs on the transmitters are illuminated as control. Thus, by a free light beam the respective receivers are illuminated, whereby the latter are switched over to "green." The "free" LED on the switching unit is illuminated.

If the start button is enabled, the outputs "A" 16-17 and 20-21, as well as "B" 8-9 and 10-11 are switched through, the drive for the transmitter switches as well into the self-sustaining state. The "output free" LEDs are illuminated.

The function of both light barriers is connected in series. The circuit contactors Kc 1 and Kc 2 switch off the light beam in case of interference.

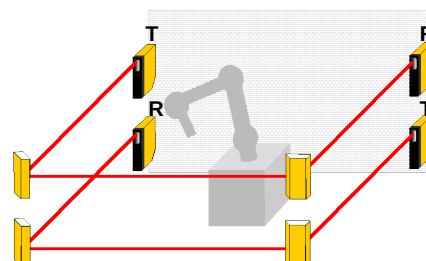
A restart occurs only after both of the light beams are enabled and the start button is pressed.

The open contactors Kc 1 and Kc 2 in series with the start button serve for functional monitoring of respective contactors.

Instruction:

During adjustment the start button must either be permanently pressed or by-passed.

The start button is to be mounted such that the danger zone is well visible from the position of the button and that without interrupting a light barrier it cannot be pressed by someone within the danger zone.



Connection diagram for the switching unit LSUW N1 Duo Duo 230V AC / 155 V 7.5

Protection of two independent danger areas 7.5.2

Application

Protecting two separate and independent danger zones or of one danger zone that is accessible from two sides (2 start buttons).



Observe Chapter 6.2!

Connection circuit diagram

Transmitter connection A 230 V AC

Terminal	EU2K SS
18	brown
19	blue

Transmitter connection B 230 V AC

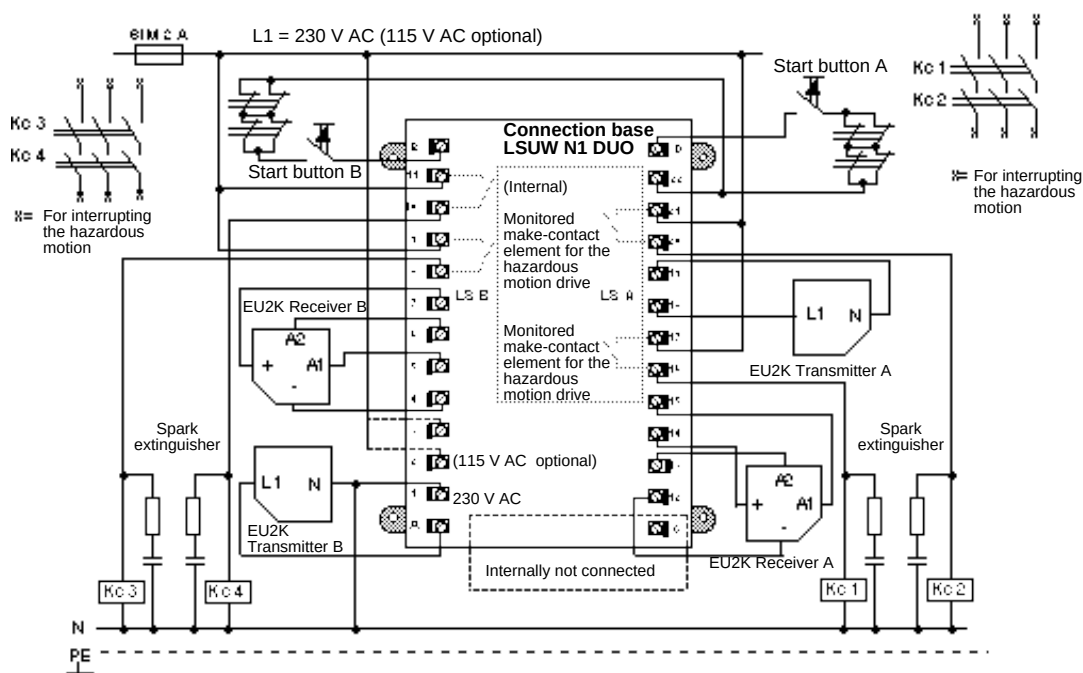
Terminal	EU2K SS
A	braun
1	blue

Receiver connection A 24 V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black

Receiver connection B 24 V DC

Terminal	EU2K EK	EU2K ES
7	brown	brown
4	green	blue
5	yellow	white
6	white	black



! Attention: 230 V AC - version. For 24 V DC - version, see Page 32, Chapter 7.8, Figure 2!

Description of functions

The transmitters A and B are switched on by pressing the start button A and B.

The LEDs on the transmitters are illuminated as control. Thus, by a free light beam the respective receivers are illuminated, whereby the latter switch over to "green." The "free" LED on the switching unit is illuminated.

If the start button is enabled, the outputs "A" 16-17 and 20-21, as well as "B" 8-9 and 10-11 are switched through, the drive for the transmitter switches as well into the self-sustaining state. The "output free" LED are illuminated.

The function of both light barriers are connected in series. The circuit contactors Kc 1 and Kc 2 switch off the light beam in case of interference.

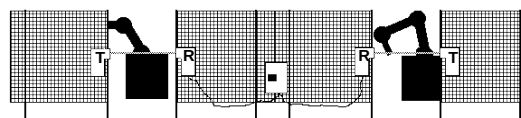
A restart occurs only after both of the light beams have been enabled and the start button is pressed.

The open contactors Kc 1 and Kc 2 and Kc 3 and Kc 4, each pair of which is connected in series with the associated start button contacts serve for functional monitoring of the contactors.

Instruction:

During adjustment the start button must either be permanently pressed or by-passed.

The start button is to be mounted such that the danger zone is well visible from the position of the button and that without interrupting a light barrier it cannot be pressed by someone within the danger zone.



Connection diagram for the switching unit LSUW N1 Muting 230V AC / 155 V 7.6

General instructions 7.6.1

Function By-pass unit (Muting) for the short-time by-pass of a safety light barrier during material movement into and out of the production cell, or for safely distinguishing between human beings and a fork-lift truck.

Application The switching unit LSUW N1 Muting is used for a certain period during the working cycle when the light barrier must be by-passed or when differentiation must be made between human beings and material flow. E.g. by the protection of bending machines, palletising machines, narrow corridor rack stores, by certain types of presses.

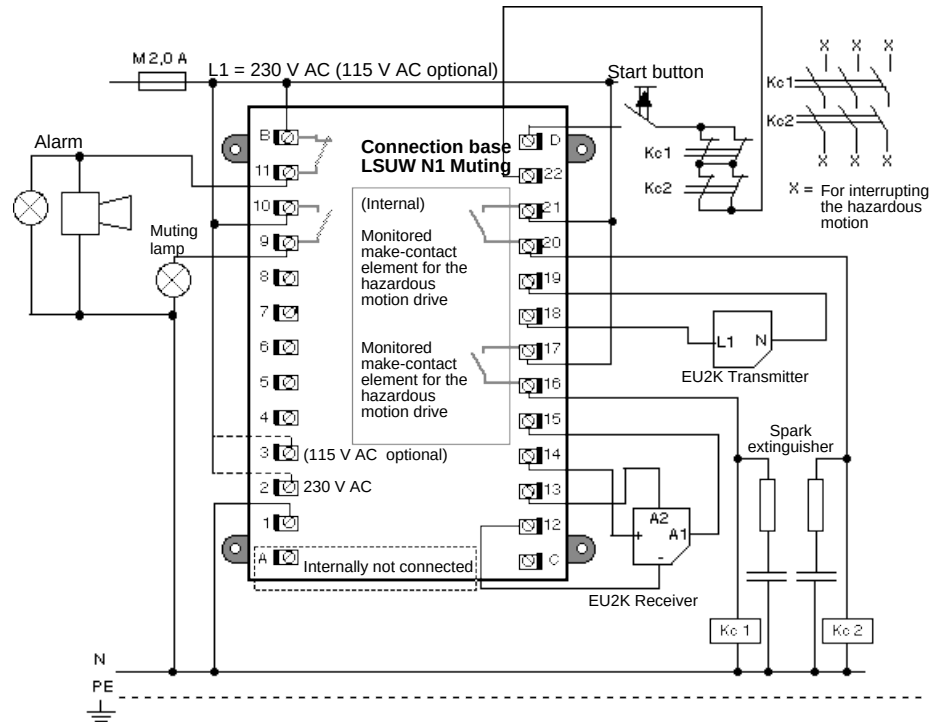
Connection circuit diagram

Transmitter connection 230 V AC

Terminal	EU2K SS
19	brown
18	blue

Receiver connection A 24 V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black



! Attention: 230 V AC - version. For 24 V DC - version, see Page 33, Chapter 7.8, Figure 1!

Description of functions

In combination with an accident preventing single-beam light barrier EU2K and four muting sensors, it is possible with the help of this switching unit to differentiate between human beings and material flow. For the muting function the following components are essential:

1. Switching unit LSUW N1 Muting.
2. Accident prevention light barrier (transmitter, receiver) EU2K
3. Four muting sensors, e.g. light barriers, inductive sensors, camshaft controller
4. Muting lamp.

In order to prevent the accident prevention light barrier from being permanently pressed by intentional manipulation, a two-channel monitoring possibility is provided, which releases the muting function after a preset time of 3 - 90 sec. The time is set by Fieessler Elektronik, according to customer specifications. A switching possibility is available additionally, enabling operation without time monitoring.

Both muting sensor channels must be connected with separate cables in order to rule out a short circuit. If the muting sensors require voltage supply for both of the muting channels, the voltage supplies for both muting channels must also be laid with separate cables. The connection to the purported + supply terminals and - terminal strip must be executed separately.

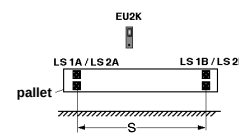
The muting lamp (max. 230 V 60 W min. 24V AC or DC max. 0.5A), which monitors the by-pass state is monitored.

Muting is not possible if the muting lamp is not connected or defective.

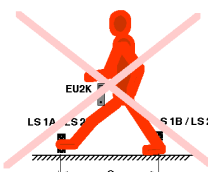
When the mains voltage is attached to the entire equipment the alarm is activated. Deactivation of the alarm is possible by pressing the key-operated start button.

For applications by which it is impossible to interrupt the hazardous motion, but rather only an alarm is signalled, a key-operated button must be used as a start button. The removal of the key must be possible only in the opened state.

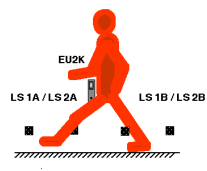
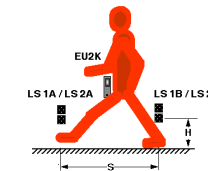
Prior to pressing the key-operated start button it must be checked whether a person is within the danger zone. The start key button must be fitted such that the protected zone can be seen.



For the system to function correctly, the distance S must be less than or equal to the length of the pallet, the fork-lift truck or the reflective strip.



The distance S must be wide enough so that it is not possible for a person to concurrently interruption the muting sensors LS 1A/LS 2A and LS 1B/LS 2B.

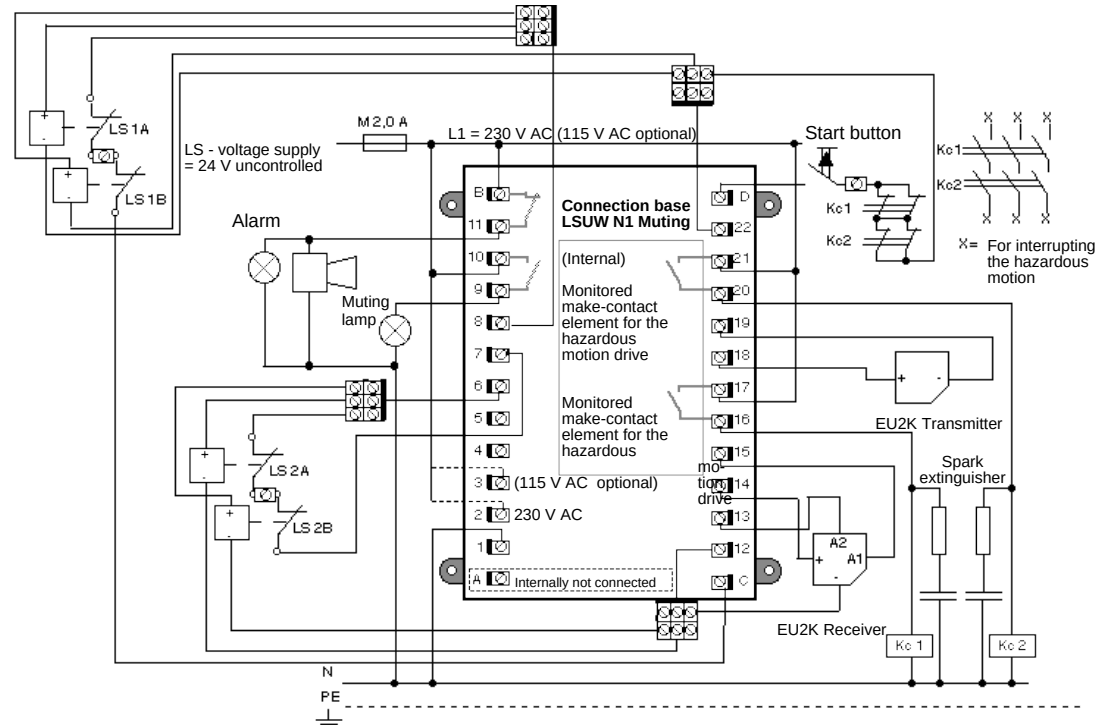


If necessary the muting sensors must be fitted in a displaced manner or the distance H to the accessible space or the distance S must be increased.

Connection diagram for the switching unit LSUW N1 Muting 230V AC / 155 V 7.6

Muting function with four muting sensors and time monitoring 7.6.2

E.g. high-lift rack protection, pallets transport systems.



! Attention: 230 V AC - version. For 24 V DC - version, see Page 33, Chapter 7.8, Figure 2!



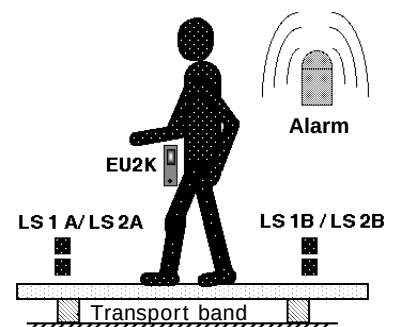
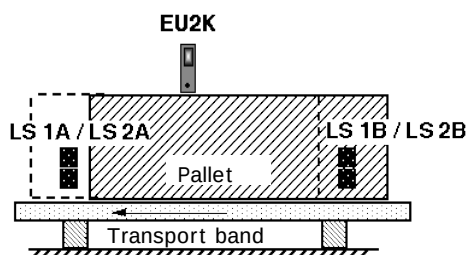
The by-pass takes place such that the contacts of the sensors LS 1A and LS 2A or LS 1B and LS 2B or all four are **open** though only as long as the maximum preset time. During this state the accident prevention light barrier EU2K can be interrupted without the alarm being activated or without the whole equipment being switched off. The alarm is activated and the equipment switched off when the accident prevention light barrier EU2K is interrupted and not concurrently by-passed via the muting sensors. This interruption is not allowed. The contacts 20-21 and 16-17 switch off.

It must be checked whether a person is within the danger zone prior to pressing the key-operated start button.

Minus and plus conductors must be laid as specified in the connection diagram, due to safety reasons. The cable for the muting channels 1 (LS 1A/B) and 2 (LS 2A/B) must be laid separately.

The muting channels contacts LS can also be replaced with end switches.

It is possible to start anew and to deactivate the alarm by pressing the key-operated start button when the accident prevention light barrier EU2K is free.



Connection diagram for the switching unit LSUW N1 Muting 230V AC / 155 V 7.6

Muting function with four muting sensors without time monitoring 7.6.3

Application

E.g.

pallets transport systems if the pallet can be stopped in the entrance area

high-lift rack protection if the high-lift truck can be parked in the entrance area.

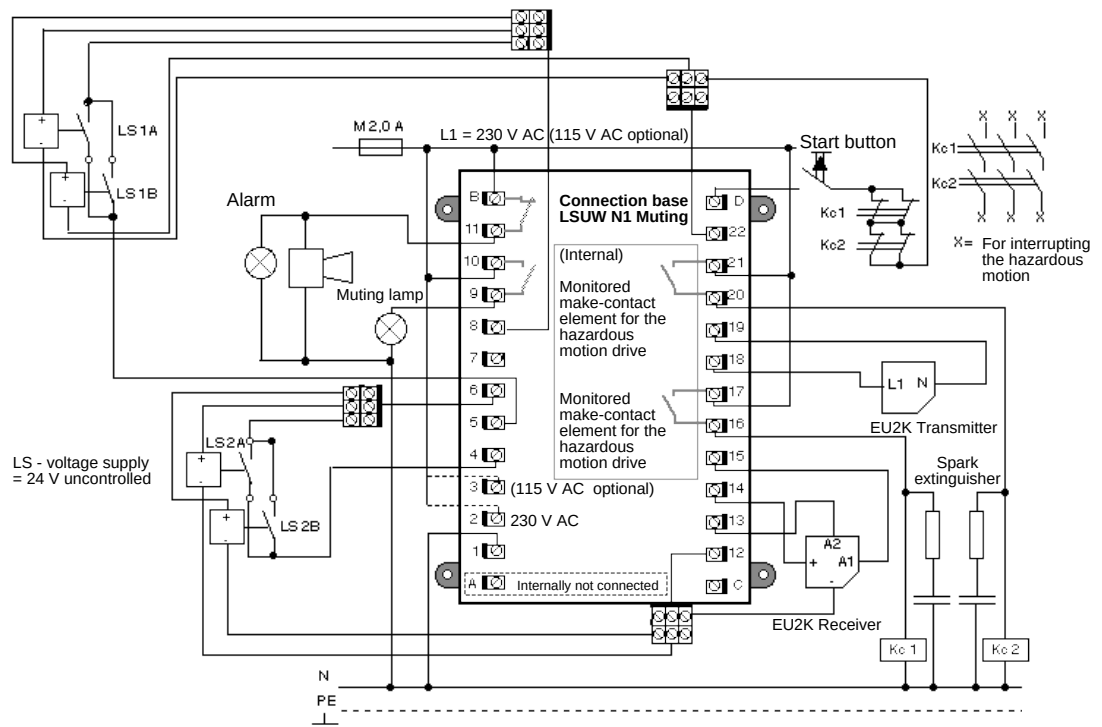
Connection circuit diagram

Transmitter connection 230 V AC

Terminal	EU2K SS
19	brown
18	blue

Receiver connection A 24 V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black



! Attention: 230 V AC - version. For 24 V DC - version, see Page 33, Chapter 7.8, Figure 3!

Description of functions



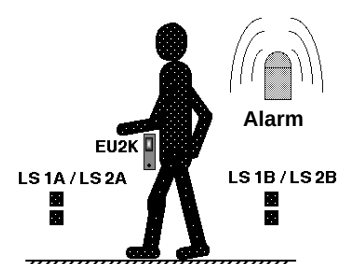
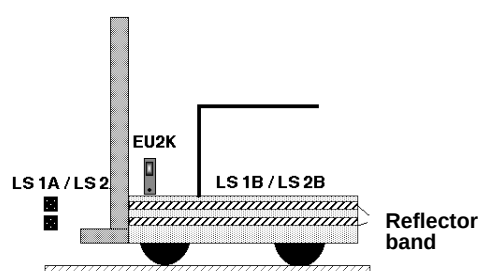
The by-pass takes place such that the contacts of the sensors LS 1A and LS 2A or LS 1B and LS 2B or all four are **closed**. During this state the accident preventing light barrier EU2K can be interrupted without the alarm being activated or the whole equipment being switched off. The alarm is activated and the equipment switched off when the accident preventing light barrier EU2K is interrupted and not concurrently by-passed via the muting sensors. This interruption is therefore not allowed. The contacts 20-21 and 16-17 are switched off.

It is possible to start anew and deactivate the alarm by pressing the key-operated start button when the accident prevention light barrier EU2K is free.

It must be checked whether a person is within the danger zone, prior to pressing the key-operated start button.

Minus and plus conductors must be laid as specified in the connection diagram, due to safety reasons. The cable for the muting channels 1 (LS 1A/B) and 2 (LS 2A/B) must be laid separately.

The muting channels contacts LS can also be replaced by end switches.
Electrical connection



Connection diagram without a switching unit with 4 contactors 7.7

Application E.g. for the protection of accessible danger zones.

Connection circuit diagram

Cable colour transmitter 230V AC

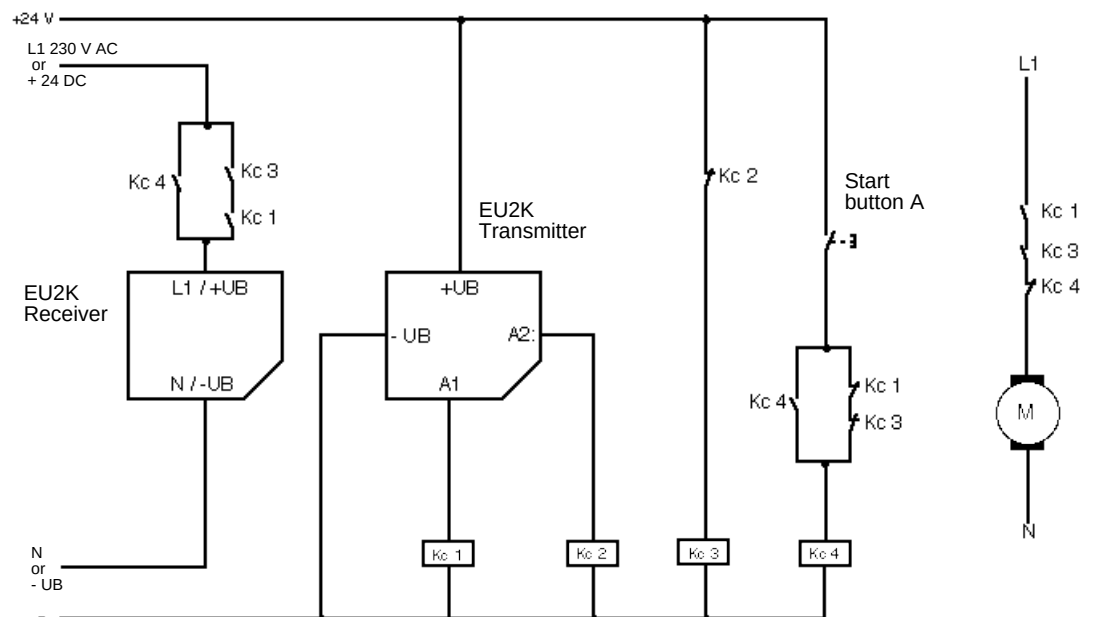
Connection	EU2K SK
L1	brown
N	blue

Cable colour transmitter 24V DC

Connection	EU2K SK	EU2K SS
+24V	brown	braun
-	white	blue

Cable colour receiver 24V DC

Connection	EU2K EK	EU2K ES
+ 24V	brown	brown
-	green	blue
A1	yellow	white
A2	white	black



Kc 1 + Kc 2 + Kc 3 + Kc 4 = Power contactors

Description of functions



Im unterbrochenen Zustand sind KC1, KC3 und KC 4 abgefallen, während KC 2 angezogen ist. In the interrupted state KC1, KC3 and KC4 are disconnected, while KC2 is connected.

By pressing the start button, KC 4 connects and the transmitter is switched on via the contact KC 4. The receiver recognises the transmitted signal and lets the contactor KC 1 to be connected via the output A1, while output A2 lets the contactor KC2 to be disconnected.

Disconnection of KC 2 connects contactor KC1 and contactor KC3.

Through the connection of contacts KC1 and KC3 the transmitter goes into self-sustaining state. The light barrier is ready to function and the start button can be released. This causes KC4 to disconnect.

The closed make-contact of KC1 and KC3 as well as the closed opener of KC4 activate the power circuit of the machine, switching it on.

Instruction:

During adjustment the start button must be permanently pressed or by-passed.

The start button is to be mounted such that the danger zone is well visible from the position of the button and that without interrupting a light barrier it cannot be pressed by someone within the danger zone.

Transmitter connection A 24V DC

Terminal	EU2K SK	EU2K SS
18	braun	brown
19	white	blue

Receiver connection A 24V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black

The connection cable of receiver and transmitter must be laying separated!

Transmitter connection B 24V DC

Terminal	EU2K SK	EU2K SS
A	braun	brown
1	white	blue

Receiver connection B 24V DC

Terminal	EU2K EK	EU2K ES
7	brown	brown
4	green	blue
5	yellow	white
6	white	black

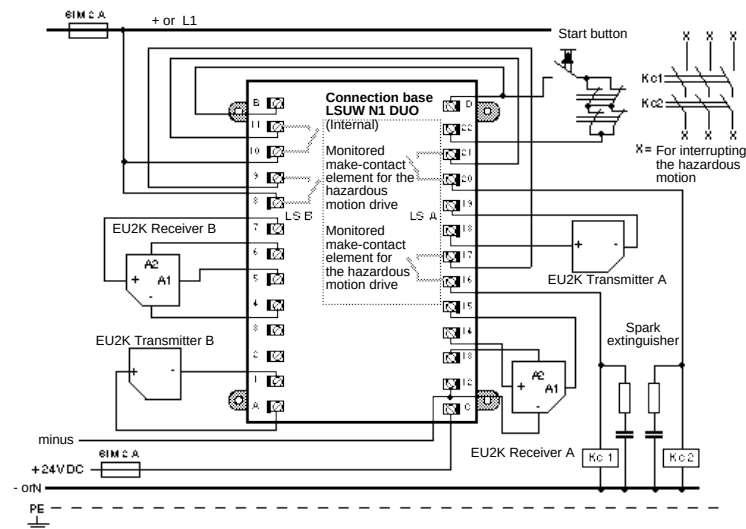


Figure 1

Transmitter connection A 24V DC

Terminal	EU2K SK	EU2K SS
18	braun	brown
19	white	blue

Receiver connection A 24V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black

The connection cable of receiver and transmitter must be laying separated!

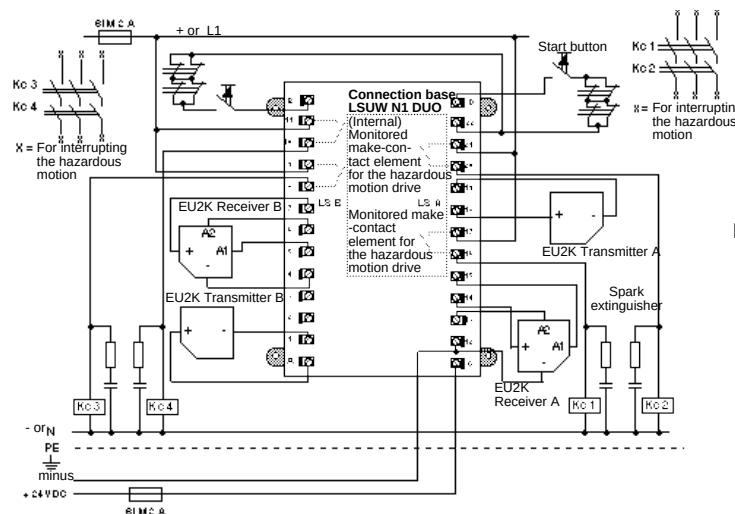


Figure 2

Transmitter connection B 24V DC

Terminal	EU2K SK	EU2K SS
A	braun	brown
1	white	blue

Receiver connection B 24V DC

Terminal	EU2K EK	EU2K ES
7	brown	brown
4	green	blue
5	yellow	white
6	white	black

Transmitter connection A 24V DC

Terminal	EU2K SK	EU2K SS
18	braun	brown
19	white	blue

Receiver connection A 24V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black

The connection cable of receiver and transmitter must be laying separated!

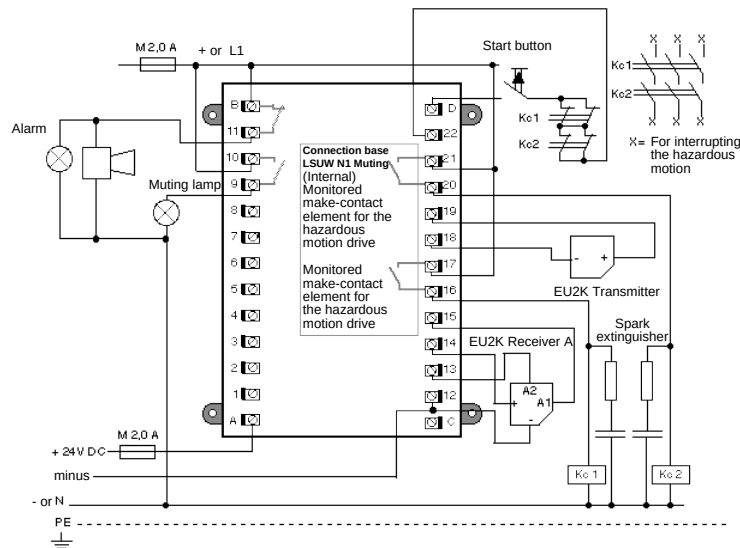


Figure 1

Transmitter connection A 24V DC

Terminal	EU2K SK	EU2K SS
18	braun	brown
19	white	blue

Receiver connection A 24V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black

The connection cable of receiver and transmitter must be laying separated!

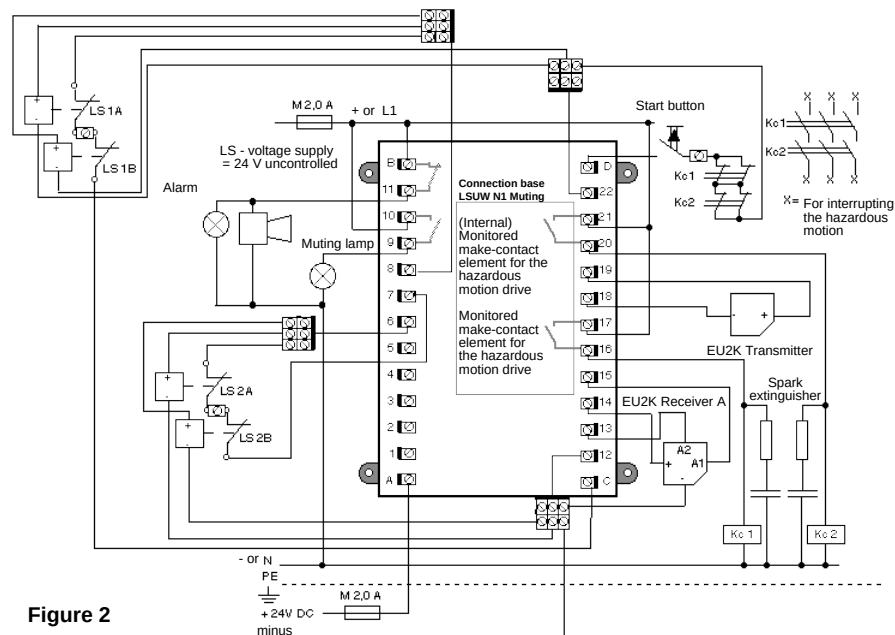


Figure 2

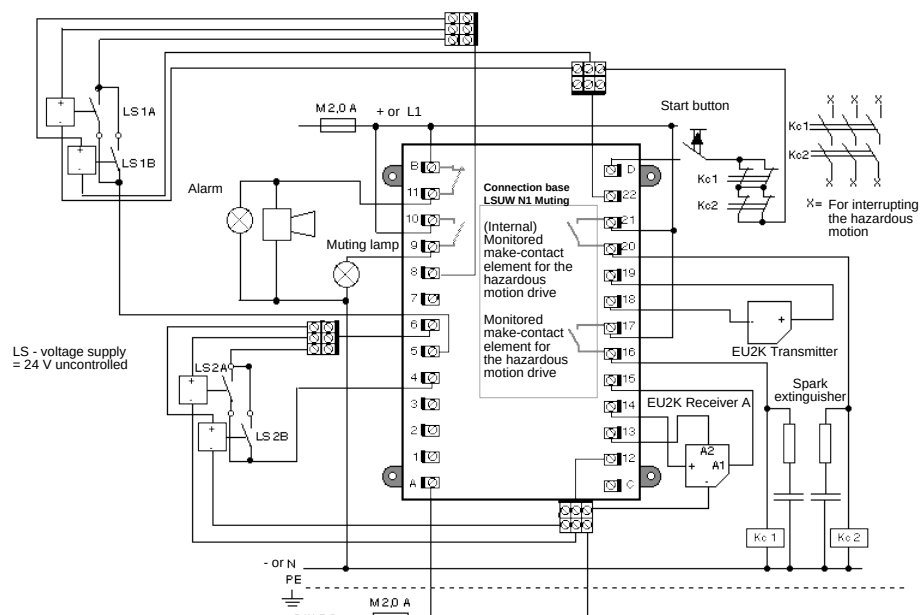
Transmitter connection A 24V DC

Terminal	EU2K SK	EU2K SS
18	braun	brown
19	white	blue

Receiver connection A 24V DC

Terminal	EU2K EK	EU2K ES
14	brown	brown
12	green	blue
15	yellow	white
13	white	black

The connection cable of receiver and transmitter must be laying separated!



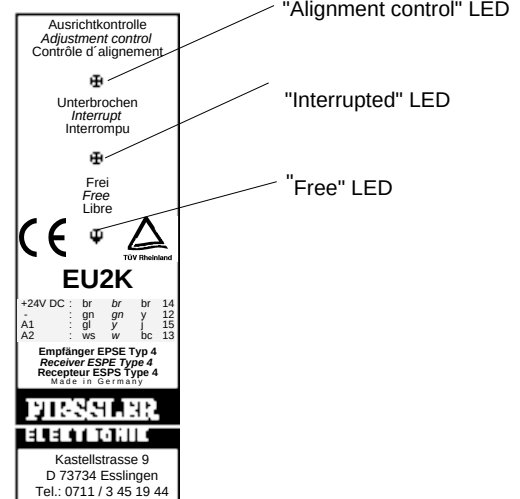
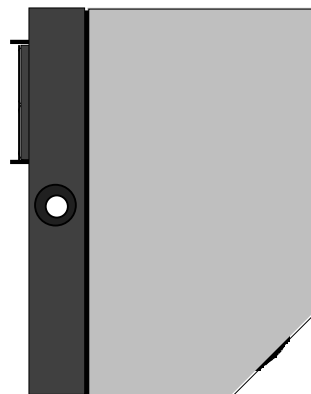
Alignment Transmitter and receiver must be fitted plane-parallel. The transmitter is switched on by pressing the start button and if well adjusted the receiver evaluates the transmitted signal. The red LEDs "alignment control" and "interrupted" are off and the green LED "free" is on. If this is not the case then the alignment must be checked.

Adjustment via the mirror For the exact alignment of the light barrier EU2K especially by long distances or via mirrors, an adjusting-aid laser is available. The device is fitted in front of the transmitter and receiver.

Adjusting-aid laser The laser light-spot must meet the opposite device in the mid-point. The test should be done on the transmitter and receiver respectively. If necessary the adjustment is to be corrected.

Adjustment-aid luminous diodes In order to recognise the adjustment state a red LED for alignment control is provided respectively at the front and rear side of the receiver:

Light barrier - free, correctly aligned	"Free" LED on, "Alignment control" LED off
Light barrier - free, too little reserve	"Free" LED on, "Alignment control" LED on
Light barrier - wrongly aligned or interrupted:	"Free" LED off, "Alignment control" LED on, "Interrupted" LED on



Trouble shooting Prerequisite for trouble shooting is the rightly adjusted light barrier

Fault	Remedy
Switching unit outputs do not provide continuity. Large red LED and the red LED on the receiver light	Transmitter defective, send back to Fieessler
Switching unit outputs do not provide continuity. The LED on the receiver and the associated LED on the switching unit do not both light or go out together	Check the cable connecting the receiver to the switching unit. If the connections are in order the receiver is defective, send back to Fieessler
Light barrier functions correctly but the switching unit outputs do not provide continuity.	The outputs are protected by an internal 3.15 A fuse. Overload has probably caused this fuse to blow. Return switch unit to Fieessler for checking
Light barrier functioned correctly for some time but now the switching unit outputs do not always provide continuity.	Check whether a spark-quench element is connected parallel to the load. If this is not the case, the relay contacts may have burned. Return switch unit to Fieessler for checking.
The entry restriction cannot be reset by pressing the Start pushbutton. The yellow LED lights.	a. Check whether the Start switch switches. b. Check whether there is continuity through the monitor circuit for the disconnecting contacts.
On connection of the receiver to the switching unit LSUW N1 or LSUW N1 DUO or LSUW N1 Muting and then obstructing and then freeing the light barrier, the green LED lights without the Start pushbutton having been pressed.	Transmitter is not connected or is wrongly connected. Refer to circuit diagram in the base of the switching unit.
The light barrier will not switch to "free" the LEDs do not light and extinguish as they should.	Clean lenses, check adjustment.
The switching on of some heavy consumer such as a large motor acts as an obstruction of the light barrier. The red LEDs light briefly.	It is probable that the cable connecting the receiver to the switching unit is laid parallel to the power supply cables. Lay the connecting cable separately. Fit the switching unit as near as possible to the receiver.



Please observe

When the light barrier is used in moistened rooms the transmitter and receiver must be mounted with the plugging-side downwards.

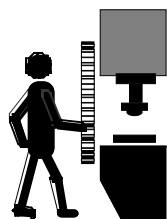
Maintenance instructions:

The EU2K system is maintenance free, as far as the design is concerned. Only the lenses in front of the transmitter and receiver should be regularly cleaned with a solvent-free cleaning agent. However, this does not exempt from the annual inspection requirement according to prEN 50100 or the national regulations.

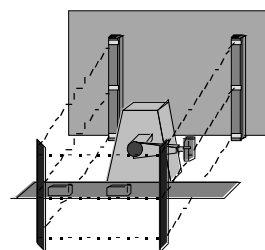


Delivery Program

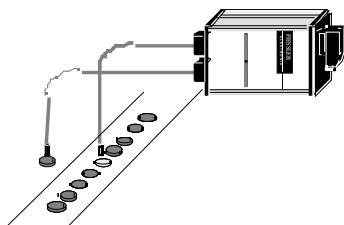
Fiessler Elektronik
Kastellstr. 9 D-73734 Esslingen
Telefon: 0711 / 91 96 97 - 0
Telefax: 0711 / 91 96 97 - 50



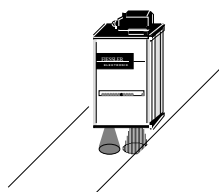
Safety-Light-Curtain



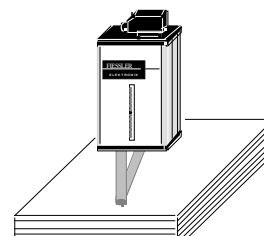
Safety-Light-Grid



Reference-Sensor



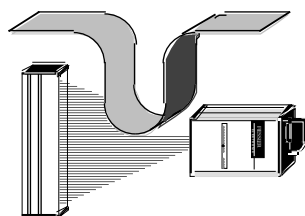
Edge-Sensor



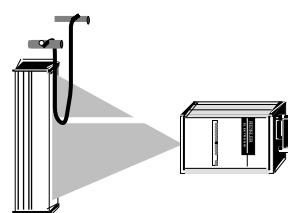
Distance-Sensor



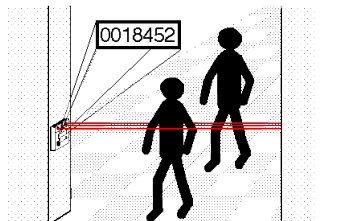
Line-Sensor



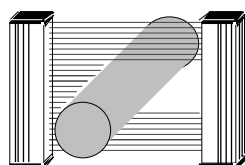
Analogue Loop-Detector



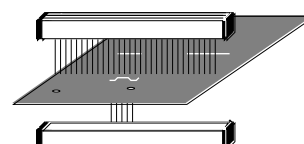
Loop-Detector For Tubes



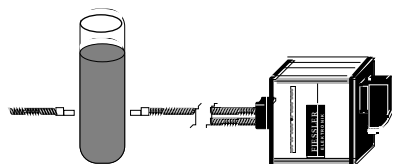
Photoelectric Controls For Counting Applications



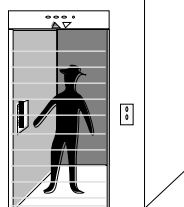
Switching And Analogue Light-Curtain



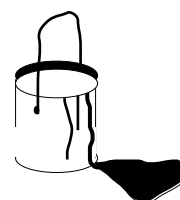
Hole -Detector



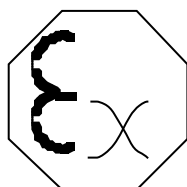
Cloudiness-Detector



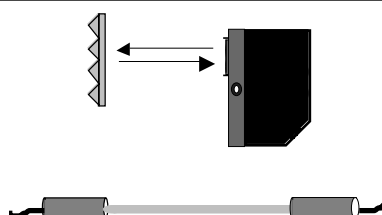
Lift Safety-Light-Curtain



Colour-Sensor



EX-Light-Barrier



Light-Barrier For General Applications



Your Application